# The Dock and Harbour Authority

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## CONTENTS



# *Editorial Comments*

**Far-Eastern Port Amalgamation.**

The primary article in this month's issue is devoted to an account of two leading Japanese ports, which have recently undergone amalgamation of a type which corresponds in some measure to what is known in this country as port grouping, or concentration within a single local administration. This change has taken place since we last gave a description of the port of Tokyo in December, 1940, in fact very shortly afterwards, to be precise in May, 1941. The project had clearly been contemplated for some time previously for a prolonged series of negotiations was necessary to reconcile and combine the interests of the two ports, Tokyo being a port with special internal and political associations, while Yokohama has been universally known for its participation in foreign trade. The distinction was perhaps most marked by the fact that, whereas Yokohama was what is termed a treaty port for the reception of goods from abroad, Tokyo was not so enfranchised and no ship of foreign registry was supposed to enter Tokyo harbour. To a certain extent the individualistic activities of the two ports are understood to have been maintained in the new and closer association, Yokohama continuing as a port chiefly for foreign trade, while Tokyo is handling commerce primarily from Manchukuo, China and the rest of the Japanese empire. How far this arrangement will continue after the war, with its likely catastrophic results for Japanese trade, is a matter of speculation upon which it would be idle to express an opinion.

Even before the amalgamation could be effected several Customs adjustments had to be made and Yokohama had to receive compensation, or indemnity, for the loss of certain financial interests, but these complications were satisfactorily adjusted in time for the amalgamation ceremony in 1941. The impenetrable cloud, or fog, of war which has since descended upon the Far East makes it impossible to obtain information about the success of the amalgamation. In any case, it would have no more than academic interest, in view of the absence of any present participation by British Shipping in Japanese commerce, and the extremely precarious future for ports of the present Japanese Empire. No doubt they will survive for further operation, and even development, but such privileges as they have reserved to themselves in their dealings with foreign nationalities in the past will probably be strictly curtailed.

**Post-War Port Re-organisation.**

Whatever be the ultimate commercial fate of Tokyo and Yokohama, their fiscal and administrative union inevitably calls attention to the kindred problem which is now occupying the minds of port circles in this country under the inspiration of the Ministry of War Transport.

At the Annual Meeting of the Dock and Harbour Authorities Association, which was reported in our March issue, Colonel Beazley, the Chairman of the Executive Committee of the Association announced that the post-war re-organisation of docks and harbours had received a good deal of consideration during the past year and that an *ad hoc* committee had been set up to look into the matter. The results of their deliberations are to be communicated to the Association in due course, it being appreciated that it was in the best interests of the Association to arrive at a well thought-out scheme within the industry, rather than to be subject to the imposition of a plan put forward by external interests.

There are a number of ways in which port administration can be co-ordinated in the better interests of commerce, the most obvious of which is the suppression of redundant and obsolete organisations and the "grouping" of effective units under single or combined control. The matter has been in the public eye for some considerable time. It was the subject of a paper to the Institute of Transport in 1936 read by the late Sir David Owen, then General Manager of the Port of London Authority. After surveying the whole field of existing port administration in this country with its overlapping and competitive anomalies, he claimed that the problem of grouping would have to be faced; but beyond enunciating certain guiding principles he refrained from making any definite proposals. The conclusion of his paper was as follows:—

After alluding to the necessity in the first place of defining a port district, he went on to say:

"There would emerge certain definite areas which from commercial and geographical conditions would naturally form districts with a common interest in port facilities and development. Each important river with its tributaries might be the natural nucleus of a district. It would be quite absurd for two or three concerns in the nature of port authorities to be looking after the accommodation for shipping in the same river. To mention the case of London, certain outports serve

## *Editorial Comments—continued*

the same population as does the Port of London, and the interest of the whole community lies in having all the ports in its area so controlled that the policy is really one of true service to the whole area.

"If we are to admit as a fundamental truth that all ports are to be so run as to be of the greatest service possible to the whole of the community of the country, then the question requires exploration as to whether they are giving that service. This involves the further question of their relations with a properly co-ordinated system of transport by road, railway, canal and coastal ships. It may be that a port system arranged on different lines might be of benefit to the various forms of transport and through them to the whole country."

Thus it will be seen that Sir David Owen felt that the question was bound up with the co-ordination of all forms of surface transport, so that, in his opinion, it would be injudicious to consider the question apart from the background of the country's transport as a whole.

**Port Hinterlands.**

Sir David's remarks were a little vague, perhaps purposely, being influenced by the inadvisability of making specific recommendations until the matter had been thoroughly ventilated in a discussion by all the parties concerned, but he emphasised one point of importance when he mentioned the conflicting ideas of port managers as to the extent of their legitimate hinterlands. With instances quoted from the propaganda literature of leading ports in Great Britain, he showed them all more or less anxious to claim that they served areas with populations greater in the aggregate than those of the Registrar-General's returns and even in excess of the possible limits of accommodation of the country. These inflated figures are, of course, largely to be taken at their advertisement value, certainly not seriously, but they show the importance attached by port officials to the sources from which their traffic is drawn. That commercial hinterlands have little connection with geographical boundaries is evident from the fact that the Port of Liverpool has (or until recently had) traffic agencies as far afield as Birmingham, Bradford and even within the portals of its rival, London. There would undoubtedly be opposition by many ports to a curtailment of the areas within which they, at present, are operating and where they have established important business connections, however inconsistent these may be with theoretically logical limits. The West Riding of Yorkshire, for instance, is the seat of the woollen industry, and obviously the ports on the Humber should be regarded as the natural channel of supply, but we think that neither London nor Liverpool would be disposed to look favourably on the diversion of their wool imports nor on the suppression of their markets in that material. Indeed, one of the chief difficulties of the situation would be the disentanglement of the multitudinous threads of commercial, banking and insurance relations, and nothing short of a complete revolution in long-established business routine would enable the activities of ports to be confined within strictly geographical limits.

This is only one aspect of a question which requires study from many angles before a decision can be arrived at. We must defer consideration of other aspects until a later issue.

**The Mid-Scotland Ship Canal Scheme.**

During the past few months, the press, and more particularly the Scottish press, has been the battleground of conflicting views in regard to the proposal for a Mid-Scotland cross-country ship canal, connecting by one or other of two alternative routes, the Firth of Forth and the Firth of Clyde. There are ardent protagonists of the scheme who point to the saving of time and security for shipping offered by the passage *via* an inland route, from the Atlantic to the North Sea. There are equally ardent opponents who retort that the plan would be extravagently costly and that no benefit would accrue to Scottish industry from its materialisation since the Canal would simply provide a short cut for foreign shipping passing between European and Atlantic waters.

The subject has been raised in the House of Commons, with the result that a Departmental Inquiry has been instituted, the findings of which are expected to be announced shortly. Meanwhile the scheme has been considered and rejected by the Glasgow Chamber of Commerce on its merits as a commercial undertaking. As regards its national and strategic value from a military and naval point of view, this, of course, is a matter for Government decision.

The Caledonian Canal, or rather an enlargement of it, might conceivably be regarded as an obvious alternative to the Forth-Clyde route, were it not for the geographical situation of the former, which is somewhat too close to the northern sea-coastal passage to be strikingly advantageous over it. Moreover, the limited dimensions and present condition of the canal present serious difficulties. It has 29 locks, and can only accommodate vessels with a draught of 14 feet, a beam of about 36 feet, and an over-all length of 160 feet; in fact, it was originally constructed by Telford in the early part of last century for fishing boat traffic. It is obviously inadequate for the accommodation of the class of modern shipping which would be likely to require its use; and suitable enlargement could only be effected at what must be considered prohibitive cost.

This Scottish Ship Canal problem is of long standing. It dates back more than half a century. Public interest was first aroused in its conception at the time of the inauguration of the Manchester Ship Canal undertaking in November, 1887. There was, at the time, a great wave of propaganda for ship canals in various parts of the country and in 1889, a National Ship Canal League was formed in Glasgow to promote the adoption of a route (known as the Direct Route) which was considered most advantageous to the interests of Glasgow. The original scheme for this route was ultimately abandoned, but the idea has persisted in a modified form and is still considered a practical proposition. Glasgow's support of the scheme was not, of course, disinterested, and indeed, evoked hostility from the port of Leith, lest the advantage enjoyed by that East Coast port as a general distributing centre for Southern Scotland should pass into the hands of the Clyde port.

Thus, the problem is by no means simple, and calls for the most careful analysis in the solution.

**Geelong Port Development.**

Clear evidence has come to hand of striking enterprise on the part of port authorities in southern Australia. Quite recently (in our January issue) we published outline particulars of a projected programme of development at the Port of Melbourne in the State of Victoria. This has now been followed by the announcement of a corresponding programme for the neighbouring port of Geelong, which evidently has no intention of lagging behind its more prominent rival. The Geelong Harbour Commissioners are stated to have placed before the Parliamentary Public Works Committee particulars of a scheme, estimated to cost about a million sterling, which is designed to meet the needs of the port for the next quarter of a century.

These needs, according to the expressed wishes of the local shipping community, comprise *inter alia*, the provision of a modern wharf for inter-state and overseas trade, with the essential rail and road communications, extensive shed accommodation and up-to-date craneage facilities, including heavy lift cranes for special cargoes. The new pier and shed are to be in substitution for the Yarra Street Pier, the reconstruction of which, contemplated some years ago, had to be postponed on account of the considerable expense involved and the uncertain international situation.

Other recommendations which have been put forward are extensions to the existing Ford Wharf and improvements at the Corrio Quay to meet the growing demand of cargo ships, and to accommodate passenger vessels. The Harbour Commissioners have also under consideration an important plan for deepening and widening the Hopetoun Channel and the approaches to the wharves generally. These, with other improvements, seem likely to occupy fully the attention of the Port Authority for some years to come, and their promulgation at the present moment, when hostilities with Japan are far from over, indicates a firm faith in the future prosperity of the port and the growth of commerce in the great southern province of the Commonwealth of Australia.

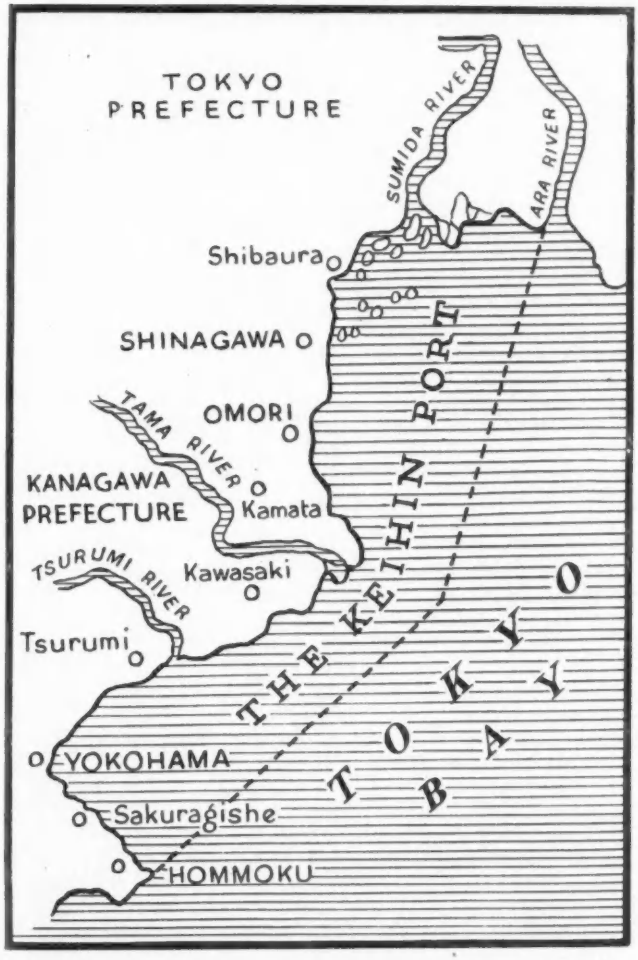
# The Port District of Keihin

## A Recent Japanese Port Grouping

### The Statutory Enactments.

BY Imperial Ordinances Nos. 587 and 588, both dated May 10th, 1941, the ports of Tokyo and Yokohama were combined in a single jurisdiction and constituted a Port District with the designation of Keihin (Tokyo and Kanegawa Prefectures).

The second ordinance establishes the boundary of Keihin Port as "within a line drawn from the West bank of the Ara river drainage channel to the westward at an angle 13 degs. south and from the point of Hommoku (35 degs. 24-ft. 42-in. North and 139 degs. 40-ft. 10-ins. East) to the eastward at an angle 47 degs. North."




Diagrammatic Map showing the extent and boundaries of the new port district of Keihin.

The official opening took place on May 20th 1941, with appropriate ceremonial to commemorate the combination of the two notable ports of Tokyo and Yokohama. More than thirty vessels in the harbour waters flew flags and decorative emblems. The 8,000 ton liner *Myoko Maru* of the Toa Kaiun Kaisha line from Shanghai was the first steamer to enter the harbour, immediately after its formal opening to foreign trade.

The actual arrangement providing for the operation of the new joint port contains certain provisions for protecting the interests of Yokohama. Tokyo harbour will be used primarily for shipping within the Yen-bloc area. Trade with other foreign countries has been specified to centre on Yokohama as before, and Yokohama is to continue as its headquarters, although the staff at the Tokyo Customs Office has been increased from seventy to two hundred in order to deal with the expected increment in trade.

Anchorage at Buoys.

All vessels entering Keihin harbour have to pass through quarantine at Yokohama before proceeding to Tokyo.

It was pointed out by the Japanese Minister of Communications at the time that the creation of the new port should make it economically practicable to transport by sea much of the freight between Kobe and Tokyo which had been and was then a source of congestion on the railways.

When the question of amalgamation was first broached by the Tokyo Municipal Government, the acquiescence of the Yokohama authorities had to be secured by an undertaking on the part of the Central Government that Yokohama should receive a subsidy in the form of a payment of interest and repayment of losses sustained by the fluctuation of foreign and domestic earthquake bonds. The total subsidy for the fiscal year 1941-2 (commencing April 1st, 1941) was estimated at 4,650,000 yen.

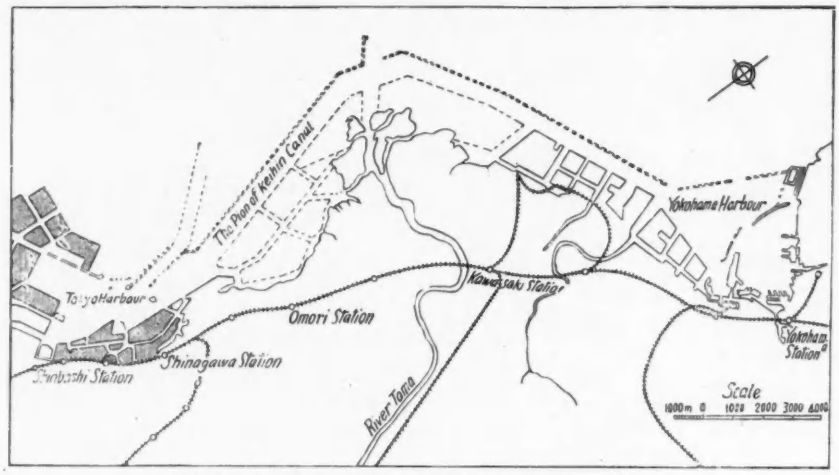
Quay and Shed.

Since the outbreak of war with Japan, it has been impracticable to obtain information in regard to recent financial developments. Moreover, there is the same lack of particulars on matters of trade and shipping. But in September 1941, it was reported that Tokyo harbour handled about 12,500,000 tons of cargo annually, valued at 1,600,000,000 yen.

## *Port District of Keihin—continued*

### Harbour Accommodation.

The harbour accommodation which was very indifferent in the early part of the century has been greatly improved and enlarged by a programme of port works, begun in 1930 and continued through 1940 at a total expenditure estimated at 34,000,000 yen. It is stated that since the harbour development works were started in 1906, a total of between 55 and 60 million yen has been expended.




Relative Positions of Tokyo and Yokohama Harbours.

In 1940 the harbour possessed 41 piers and quays, totalling about two miles in length, which were capable of accommodating at one time sixteen vessels of from 3,000 to 6,000 tons. In addition, moorings were provided at buoys with mooring space for some thirty ships. The depth of water was sufficient to enable a fully laden vessel of 7,000 tons to enter the harbour at low water. By taking advantage of the tides, the *Kitta Maru*, 16,500 tons, has been manœuvred up to the Shibaura Dock.

### Trade of the Port

The trade of the port consists mainly of cargoes of coal, iron, lumber, cement, rice and other cereals. Prior to the war foreign commerce brought into the port 200 million yen worth of goods annually

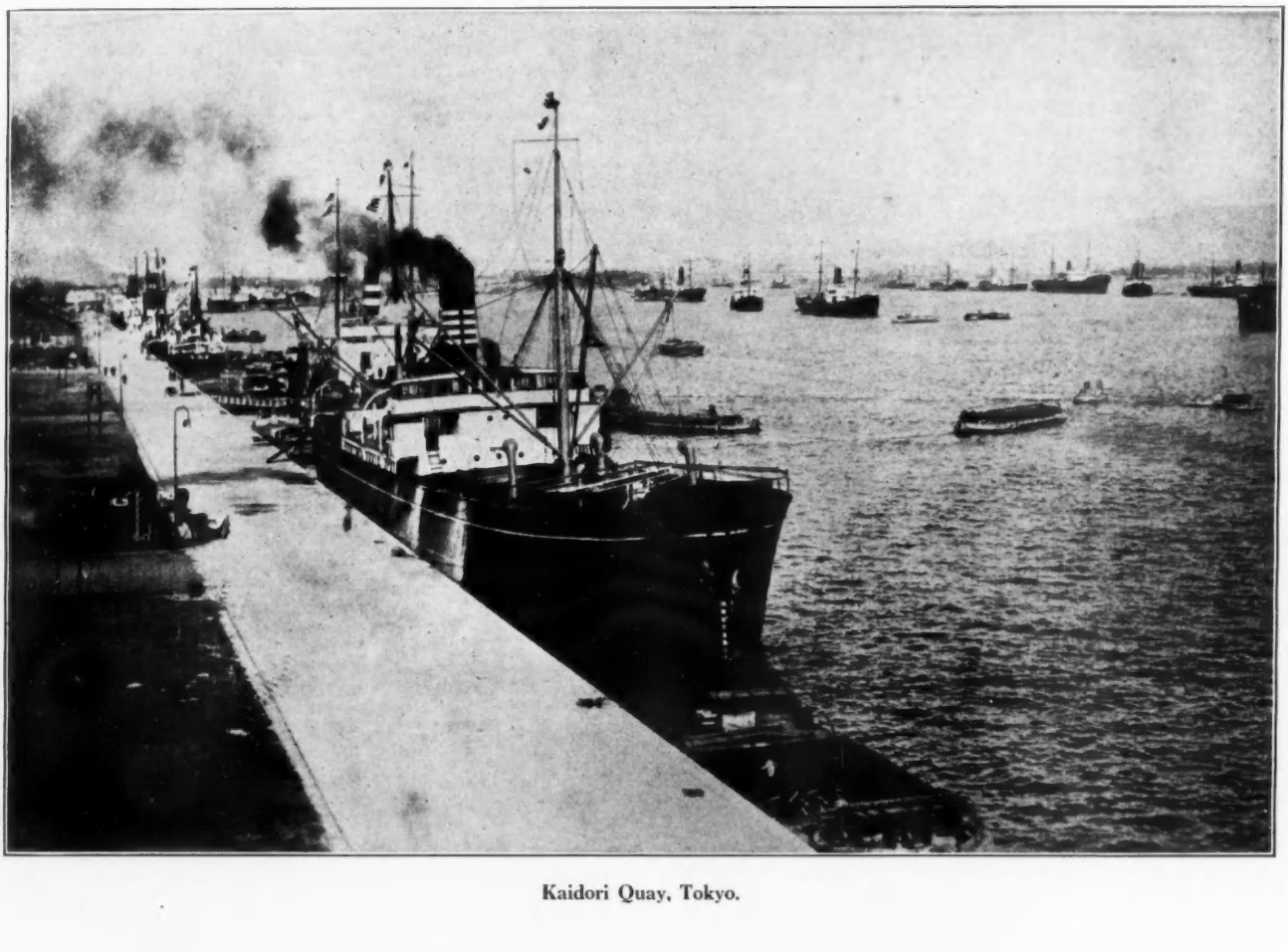
### The Keihin Canal

The twin ports are connected by the Keihin Canal which has a length of 22,600 metres and is from 600 to 700 metres wide and nine metres deep Vessels of the 10,000 ton class can use the canal. Spoil from the excavation has been used to reclaim portions of the harbour area on which industrial works are to be established, so as to form an Industrial Zone in the port.

### Proposed Harbour Development

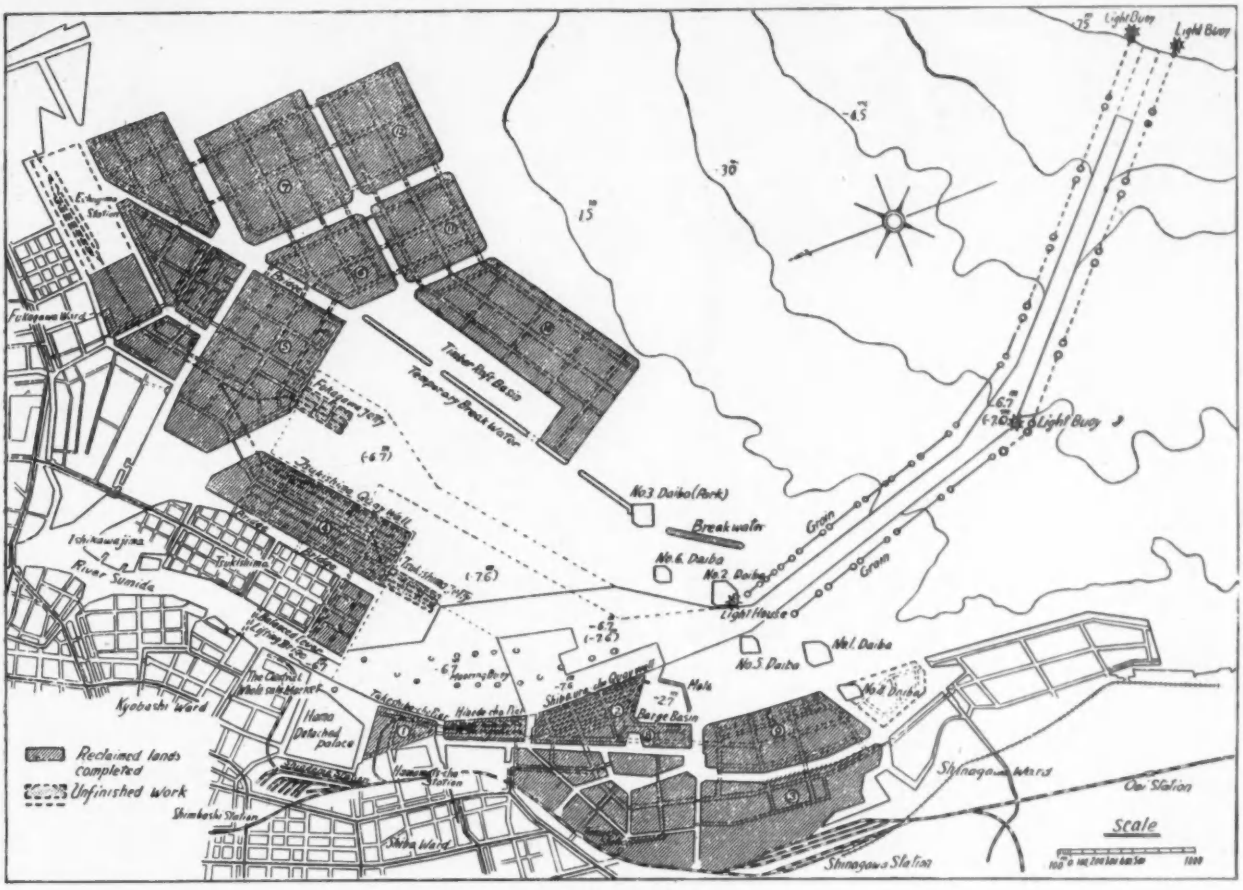
The war may have caused some dislocation or postponement of development projects at the port ,but, in 1941, plans had been formulated which assigned an outlay of 40,000,000 yen on improvements in the harbour accommodation and facilities.

Most of the expenditure was to be incurred on constructional work between Shinagawa and Omori. The plans made provision for the widening of the main channel, an extension of



Kaidori Quay, Tokyo.

## *Port District of Keihin—continued*




Plan of Tokyo Harbour.

the breakwaters and an increase in the number of buoy anchorages from 21 to 40. By this arrangement, the harbour would be capable of accommodating simultaneously 80 vessels of under 6,000 tons each. It is anticipated that the quantity of cargo consigned to Tokyo would reach a total of 25,000,000 tons annually.

### Advantages of the Amalgamation to Tokyo.

The chief advantages accruing to Tokyo from the amalgamation of the two ports have been set out as follows:—

(1) Goods are transported from Yokohama to Tokyo by sea by lighters and a quarter of the tonnage on land by motor lorries. Of the consumption of petrol hitherto required, 60 to 70 per cent. will be saved by the opening of the Tokyo port.

(2) The lighterage from Yokohama to the Eitai Bridge on the Sumida River is Y. 1.75 per ton, while the freightage from Yokohama to the Shiodome Freight Station of Tokyo is Y.10.60 per ton. These high rates of transportation will be considerably lowered by the operation of the new port, contributing much to the regulation of the prices of commodities. The lighter service between the two points is lacking in efficiency, because a wind of over five metres in velocity interrupts the operation of small lighters, causing them to suspend service for about one third of the year. Moreover, against the considerable damage frequently done to cargoes by wind and waves, it is requisite to insure the goods. The new port of Tokyo will remove these troubles and lower the prices of export and import goods.

(3) To make matters still worse, owing to the shortage of lighters and trucks due to an enormous increase in traffic, the need for an economy of oil, the insufficiency of labour and some other factors under wartime conditions, transport between Yokohama and Tokyo has of late been without satisfactory efficiency and rapidity. This shortage of transport capacity will, it is considered, also be to a considerable extent remedied by the opening of the port.

### Aerial Transport.

Up to a decade ago, Tokyo was without an adequate airport. Then in 1938, the municipality decided to establish a large international airport on the water front at an estimated cost of 10,000,000 yen. It is located on reclaimed land, and is understood to have been completed just before the outbreak of war.

### Greater Keihin.

When Keihin Port has reached its full development embracing Yokohama at the western extremity and the coastal ports of Yedogawa and Chiba to the East, with Tokyo and the Keihin Canal at the centre, the whole will form a port entity of considerable magnitude, in the front rank of world ports, if the impending disastrous effects of the world war do not intervene, as well they may, to bring about the economic collapse of the country.

### Acknowledgment.

The information on which the foregoing article is based has been largely extracted from recent articles in *The Far Eastern Review* and *World Ports*.

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### Territorial Promotion for Port General Manager.

A notification has recently been made in the *London Gazette* of the promotion of Sir Douglas Ritchie, M.C., General Manager of the Port of London Authority to the rank of Colonel in the Engineer and Railway Staff Corps (Territorial Army).

**Board Room of the Southampton Harbour Board.**

# *The Southampton Harbour Board and their Board Room*

The above photograph of the Board Room of the Southampton Harbour Board with the Members in session was taken at the close of the Board Meeting on the 24th February, 1944.

Seated at the top of the table is Mr. Harry Parsons, J.P., Chairman of the Board, and on his right is Alderman Sir Sidney Kimber, J.P. (Deputy Charman of the Board and Chairman of the Works and Harbour Committee), and Mr. Henry Mayes (Chairman of the Quays and Pier Committee). On the Chairman's left is Alderman F. Bath, O.B.E., J.P. (Chairman of the Finance Committee).

Seated on the left hand side of the horseshoe table are the following Board Members (reading from the bottom of the photograph):—Mr. T. Lewis, J.P., Alderman H. Vincent, J.P., Alderman F. R. Brown, J.P., Alderman P. V. Bowyer, Councillor G. A. Waller, J.P., Mr. F. J. Downer, Alderman E. F. Usborne, Mr. A. H. Scanlan, Mr. J. Bartle Hastings, and on the right hand side also reading from the bottom of the photograph are:—Captain A. S. Mackay, R.D., Colonel J. S. Payne, Captain F. G. Spridell, C.B.E., R.D., R.N.R., Mr. H. A. Short, M.C., Captain P. A. Morgan, R.D., Captain A. Johnstone, D.S.O., R.N., Commander J. Bird, Mr. M. G. J. McHaffie, Mr. D. Storrar and Mr. C. E. Cotterell, J.P.

Seated at the centre table reading from left to right are:—Mr. H. R. Denley, Pier Manager and Committee Clerk, Mr. O. H. Lewis, General Manager and Clerk, Mr. J. P. M. Pannell, Assoc.M.Inst.C.E., A.M.I.Mech.E., Engineer, Captain F. W. Frampton, Harbour Master, and Mr. E. A. Shillington, Accountant and Deputy Clerk to the Board.

**The Board Room.**

The Board Room is 33 ft. square and is panelled in African mahogany. At each corner of the room is a group of three

**The Harbour Office.**

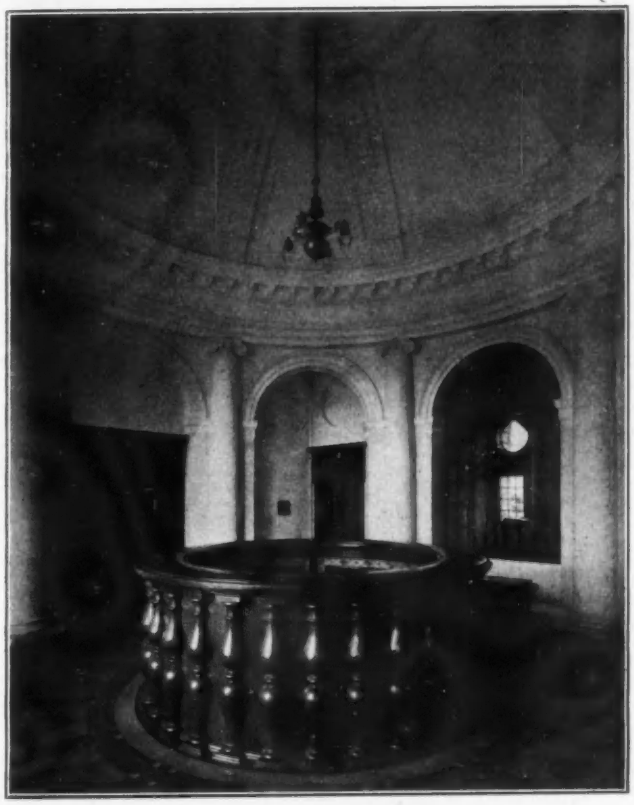
## *The Southampton Harbour Board—continued*

Ionic columns, these being of mahogany with bronze capitals and bases. The ceiling is of ornamental plaster decorated in keeping with the columns.

The room is lighted by large windows on three sides, clerestory lights to the ceiling and by clusters of electric lights in crystal fittings hung on chandeliers and independently.

The seats of the Chairman, Deputy Chairman of the Board and Chairmen of Committees are at the upper table, and the Members of the Board sit at the horseshoe table. These tables are of African mahogany and the inner round table, which has a top of striped Sapele mahogany, is used by the Officers.

A feature of the decoration of the Board Room lies in the coloured bas-relief panels illustrating historical ships, which were removed from the White Star liner *Teutonic* when that ship, so well known to a former generation, was broken up.



First Floor Lobby of Building.

### The Board's Offices.

The Board's Offices are situated on the site of the ancient Watergate Quay, which dates from the 13th century, face a north westerly direction and command views of the River Test and Southampton Water.

The original offices were incorporated in the present structure which was opened by Admiral of the Fleet the Earl Jellicoe of Scapa, G.C.B., O.M., G.C.V.O., in 1925. The building is of red brick with stone facings, having a dominating central tower with dome. The whole is surmounted by a weather vane in the form of a galleon over a terrestrial globe.

The Committee room overlooks the Old Docks, Southampton Water, and the River Test on three sides respectively. The room is panelled and furnished in oak and has a decorative plaster ceiling.

The first floor lobby, which opens on to a balcony, features eight equidistant columns separating arched panels and surmounted by a domed ceiling. Tapestries decorate the panels not occupied by doors or windows.

The architect was Mr. E. Cooper Poole, Assoc.M.Inst.C.E., the late Engineer to the Board, the contractor being Messrs. Henry Cawte of Southampton.

# *Tyne Improvement Commission*

## *Presentation of Accounts*

In presenting the accounts of the Commissioners at a recent meeting of the Board, **Mr. W. A. Souter,** Chairman of the Finance Committee of the Tyne Improvement Commission, reported that after meeting all expenditure and making full provision for interest charges and loan redemption (£125,877) in accordance with statutory requirements, the Commissioners have a surplus for the year of £4,275, a result which should be considered satisfactory, more especially as the loan debt had been reduced during the year by £59,812. In his remarks, Mr. Souter pointed out that it was noteworthy that this was the first year in the history of the Tyne Commission in which the gross receipts have exceeded one million pounds. The welcome improvement in the losses of ships brought about by Allied successes in the Battle of the Atlantic are reflected in those figures.

The tendency, he said, in connection with the taking up of new money has been for loans to be over longer periods largely influenced by Government regulations brought in during 1943 for Municipalities and Authorities like the Tyne Commission.

After referring to the present volume of coal shipments which have been materially affected by the War, Mr. Souter said that the shipments from the Tyne in pre-war years such as 13¾ million tons in 1937 or 21½ million tons during the boom of 1923, would be recalled with regret and pointed out that the Board must always remember that the shipment of coal is the mainstay of the Tyne, just as it is one of the main exports of the United Kingdom.

Referring to the Ferries between North and South Shields, he drew attention to a small surplus of £942 compared with the previous year's deficit of £7,349. After taking into consideration certain payments for H.M. Service traffic for war years which have been received from the Government, the accumulated deficit on the Ferries Account has been reduced to £12,500. Continuing, Mr. Souter said that increases in fares had been inevitable under circumstances which could not be regarded as satisfactory either by the Tyne Commission or the Ferries users. The way out which has been suggested, and indeed urged to the Tynemouth and South Shields Corporations by the Ministry of War Transport, who offered to bear half the cost of both capital and revenue expenditure provided the Corporations take over and make the ferries free, has so far, not commended itself to the inhabitants of the Harbour Boroughs. Mr. Souter believes that that is the ultimate solution.

In concluding, Mr. Souter said, that the Commission had got through four and a half years of war without the Tyne finances being impaired. What 1944 would bring no one could tell. It was certain that great events would come to pass and it is generally assumed that invasion of the Continent will take place. He added that it is impossible to foresee at present what will be the effect of this great adventure upon Tyne trade. It, therefore, behoved the Commissioners to continue to observe a conservative attitude until the position became clearer.

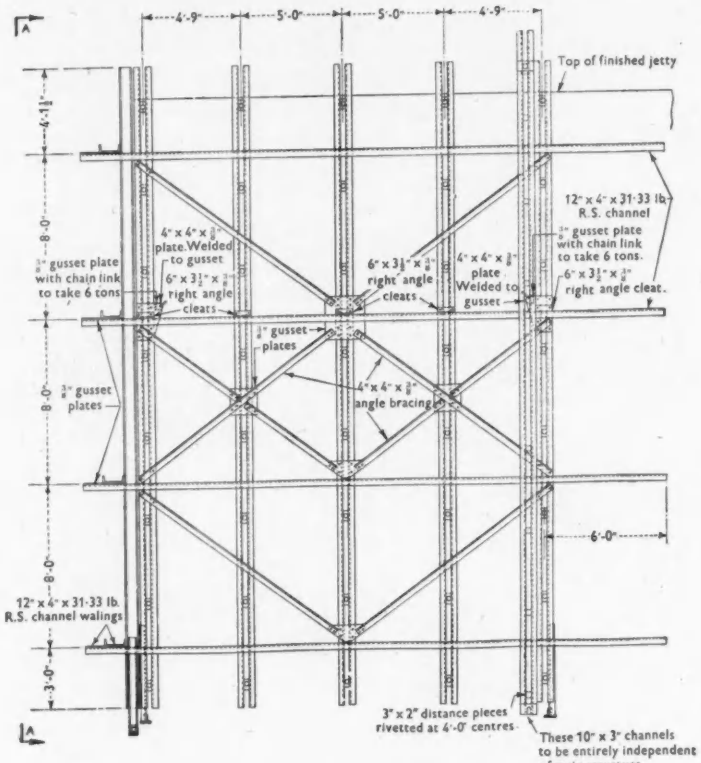
### Meaning of " Jerque Note."

A correspondent, who raised in the *P.L.A. Monthly* a question as to the origin of the term " Jerque Note " or " Jerquing Note," has received the following editorial reply made with the assistance of Mr. Leftwich, H. M. Customs Librarian:—The word " jerque " meant originally to search a vessel for unentered goods. Now it means to examine or search a ship's papers to see if the Master's and Custom House papers tally, and if the cargo has been correctly entered and described. In old and middle French are a range of variants—*cercier, cerquier, cerkier, cierquer, cerquier* and *cercher*. All these are from the popular Latin verb *circare* (to go round). Whilst the modern French *chercher* came through the old French forms, *cherquier* is almost certainly the form that gave us " jerque."

The " jerquing of ledgers " is a long-established and well-understood term at the docks of the Port of London and involves the searching of ledgers for outstanding charges.

# *A Quick Method of Constructing Concrete Wharves and Piers below Tides*

FIG. 1

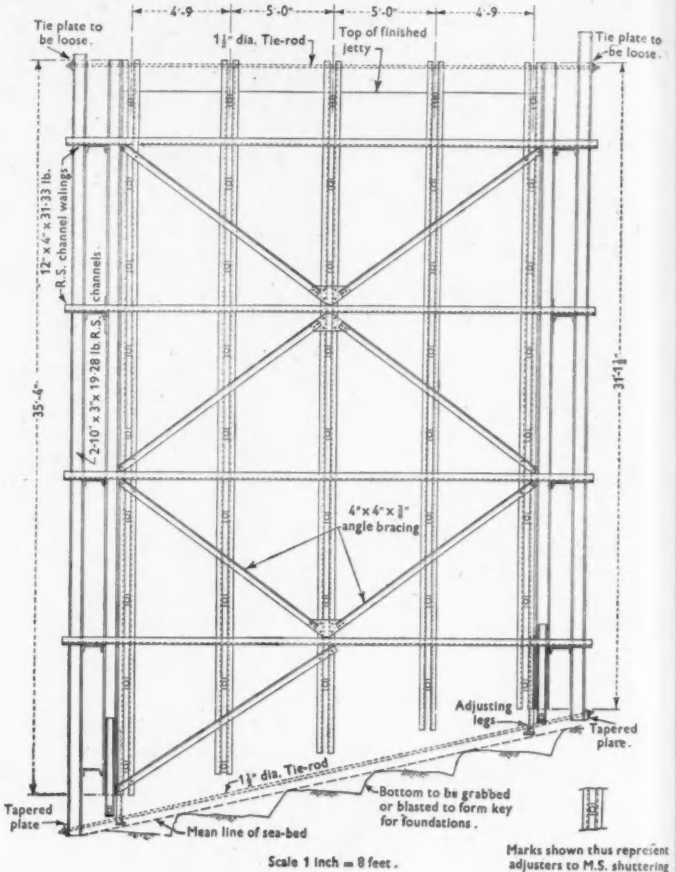



Frame on outer face similar but 35'-4" overall length of 8" x 3" R.S. channel guides.
⅜" mild steel plate shuttering omitted for clarity.

ELEVATION OF SHUTTERING FRAME ON INNER FACE OF JETTY

Marks shown thus represent adjusters to M.S. shuttering to be spaced at 4'-0" centres.

FIG. 2

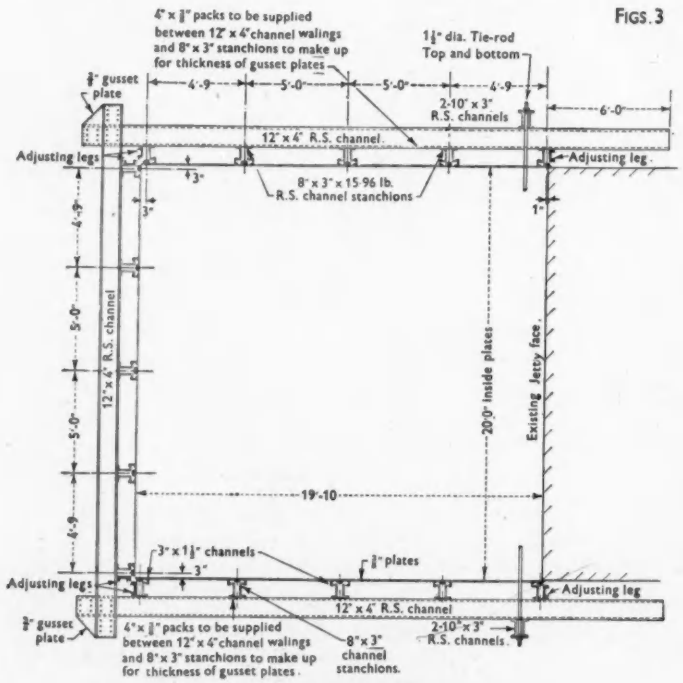



Scale 1 inch = 8 feet.

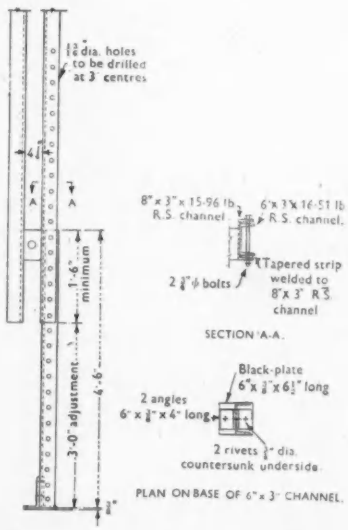
ELEVATION ON LINE A-A.

Marks shown thus represent adjusters to M.S. shuttering to be spaced at 4'-0" centres.

FIGS. 3

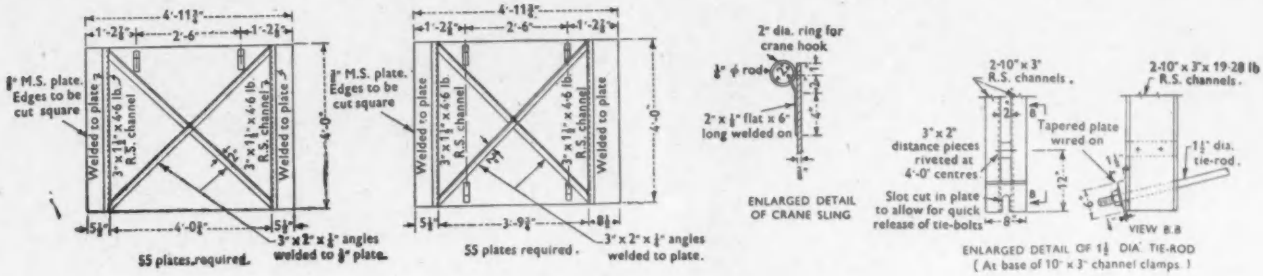



PLAN OF SHUTTERING FRAME




ENLARGED DETAIL OF ADJUSTABLE LEGS.

FIGS. 4




SHUTTERING FRAME DETAILS.

# *A Quick Method of Constructing Concrete Wharves and Piers below Tides**

By HAROLD BEECHAM TEMPLE-RICHARDS, B.Sc. (Eng.), M.Inst.C.E.

The many types of pier design to meet particular conditions and requirements, and the methods of construction employed, are well known.

The following devices are suggested as a quick method for constructing piers when the design is either all concrete, concrete with rubble hearting, or concrete block walls with concrete and rubble hearting, founded on a prepared hard or rock bottom.

Site conditions vary considerably, but it is assumed that there may be waves up to 3 or 4 feet in height. Again, remoteness and inaccessibility of the site may limit the size of plant that can be used, and consequently the size of pre-cast concrete blocks for the skin walls.

Generally speaking, under such conditions the method of construction by means of pre-cast concrete block skin walls, with concrete and rubble hearting, is slow, involving a considerable amount of diving work which may be held up by bad weather, or delayed by cold in northern waters. Similar considerations apply to the standard methods that have been used in the past for construction in concrete, by means of under-water shutter work.

The following proposals curtail and simplify the diving work required, reduce the quantity of falsework which is subject to wave action with consequent damage and delay, and give a far higher speed of construction.

The procedure is to construct the first portion of the pier, which is accessible in the dry, by standard methods. Thereafter, the pier is constructed in fixed lengths by means of a special movable steel framework, which carries movable steel shutters, as shown in detail in Figs. 1—6.

The framework is open and is maintained in position by the steel walings overlapping and being chocked off the last completed length of pier. The framework is floated into position during the hours of, say, half tide to high tide, by means of two barges or camels, after the bottom has been prepared to a firm foundation and key.

It will be observed from the Figures which illustrate the design for constructing an "L" arm of jetty, that they provide for a sloping rock bottom transverse to the length of the pier, as is likely to occur in the head portion of an L-shaped pier.

The framework has adjustable feet on the front and back lines, and the bottom movable shutters on the end are cut to a slope on the bottom edge, thereby saving diver work in sealing the bottom plates with bagged concrete or spalls.

The steel shutter-plates are lowered between the guides into position as required and are then brought up to correct alignment and locked by means of a very limited number of capstan-headed screws, which give the divers the minimum of work. By slacking back these screws, 3 inches of play is given to enable the shutters to be removed.

After the foundation has been pocketed or benched, where there is a cross fall, in order to secure the foundation against slip, the framework is floated into position, and the inshore end is chocked off the last length of finished pier.

The feet are previously adjusted to the cross fall of the prepared rock foundation. When necessary, the outer feet are held in position by a small quantity of bagged concrete or rubble. The bottom steel shutters are

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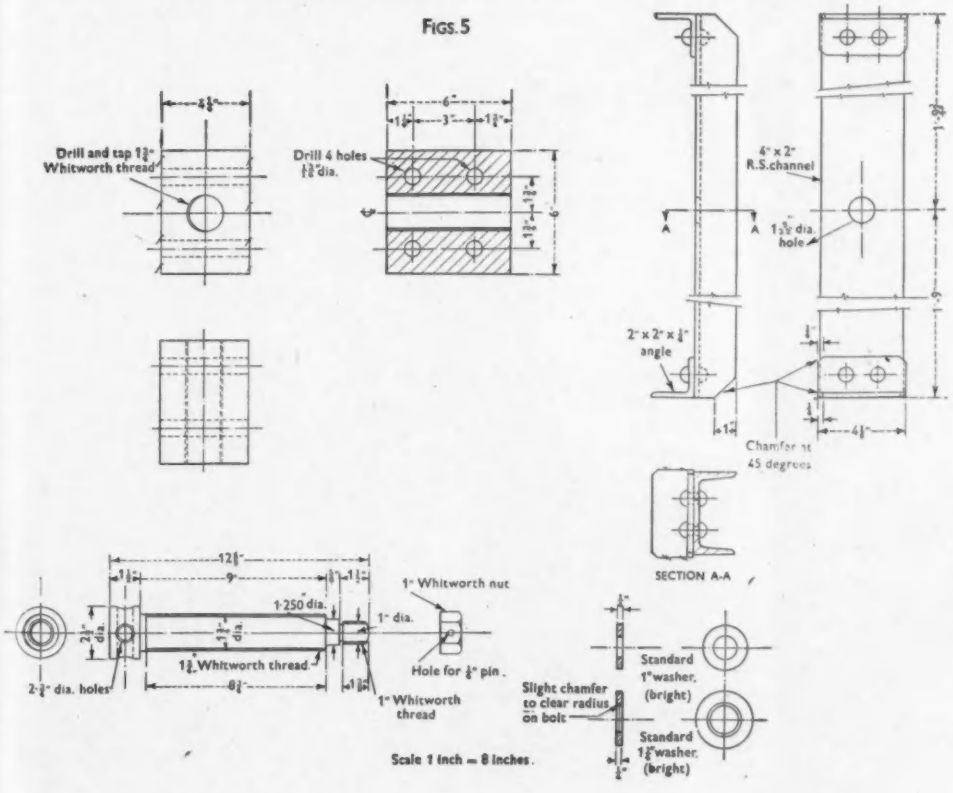
FIGS. 5



## *A Quick Method of Constructing Concrete Wharves and Piers below Tides—continued*

lowered into position and set up by the capstan screws. Owing to their shape, and to the fact that they pass through their guides to the rock bottom, the quantity of packing required at the bottom to retain the concrete is limited. This packing can be achieved by lowering graded hardcore by hopper where necessary, or by bagged concrete.

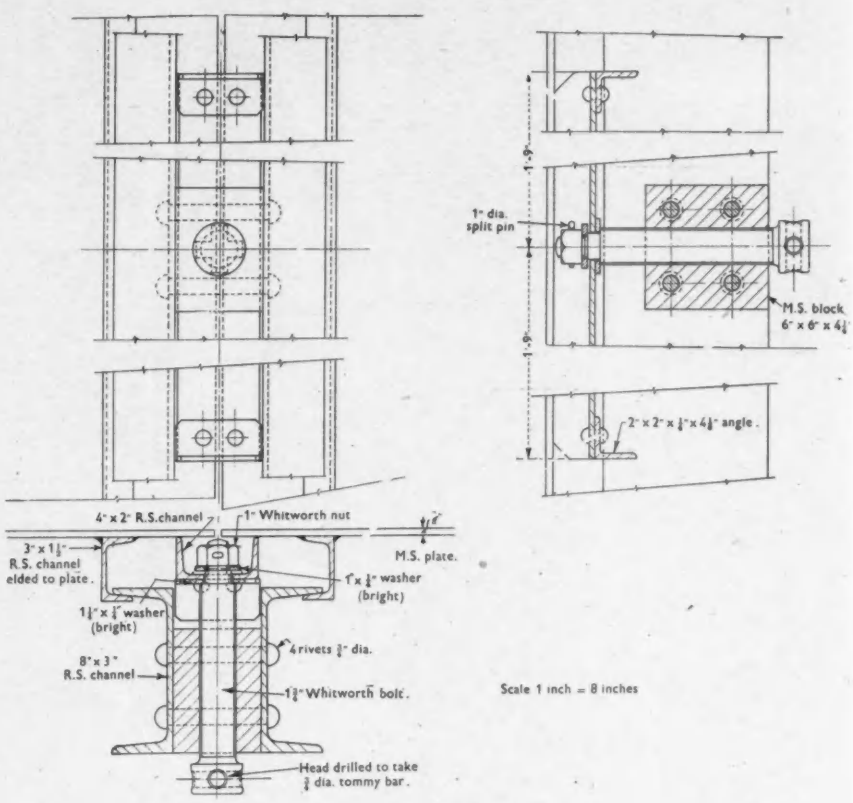
The bottom lift of concrete is then deposited. If normal or rapid hardening cement is used, with from 1 to 1½ per cent. calcium chloride, setting will take place fairly rapidly, and the next lift can proceed quite quickly without the development of much shutter pressure from the concrete.

As soon as the first foot or two of concrete has been deposited in the foundation, the framework is secure against any likely bad weather, more particularly as all the upper portion under water, which is subject to wave action, is left open. On completion of the length of wall to full height, the shutter-plates are released, eased, and removed, the inshore chocks are knocked out, and the framework is lifted slightly by the barges and brought forward for the next prepared length of foundation. It will be observed that during this move the last stretch of completed work maintains the frame under control and in position.

The illustrations are fully explanatory in all other special details.

Later, when a pier has been constructed by this method, the Author hopes to describe, in a further Paper, some of the practical features and the efficiency of the device.

FIGS. 6




# *Mid-Scotland Ship Canal*

## *Acute Controversy*

Increasing public interest is being displayed in the movement for a ship canal across Scotland, as is evidenced by press reports below.

At a recent meeting of Scottish M.P.'s of all parties the following resolution was passed:—

"That this Meeting unanimously declares that it will take all steps to unite support for the construction of a Forth-Clyde sea-level ship canal as an essential feature of the Government's plans for post-war development."

Subsequently it is stated a memorandum has been prepared for transmission to the Government urging that the Canal should have a position of high priority in the programme of post-war works.

**Attitude of Glasgow Chamber of Commerce.**

At the Annual Meeting of the Glasgow Chamber of Commerce Mr. P. D. Ridge-Beedle criticised the attitude of a Committee of the Chamber towards the question of the desirability of the canal. He urged that all the evidence in favour of the project should be collected and submitted to the Government in order that Scotland might share in the benefits of the undertaking.

In the report on the business of the past year, it was stated that the committee had resolved to recommend that the project of the canal as a commercial proposition could not be supported, but the directors had decided that the matter should remain open for further discussion.

The committee's recommendation, Mr. Ridge-Beedle said, would be perfectly sensible and reasonable if the Chamber of Commerce was asked to issue a prospectus appealing to the investment public to support a Mid-Scotland ship canal company, but the position was altogether different. The committee had looked at the matter from the wrong standpoint. That was a scheme in which the Government would supply the money, and the duty of the Chamber, which existed to foster prosperity in its area, was plain. It was to collect all the evidence it could possibly get in favour of the canal and put it before the Government.

The Chamber's committee had further stated that if the cost was to be in the neighbourhood of £70,000,000, or even £50,000,000, such national money might be expended in other ways to achieve much greater benefit for Scotland. That showed a serious misapprehension. The committee seemed to have looked upon the matter as a parish-pump scheme to give a dole to Scotland.

That was not the idea at all. It was a scheme for Great Britain and that area had been chosen only because of its geographical position, as the place where the North Sea and the Atlantic were brought closer together. It was owing to that lucky circumstance that they had a chance of that great scheme, and if they did not accept it, the money would not be spent in Scotland but would quite likely be spent in England.

Manchester people were agitating for the Manchester Ship Canal to be extended to the East Coast, and that was not such a fantastic scheme as might be imagined if they looked at the territory through which it would pass. There was also a proposal for a canal from Carlisle to Newcastle, so that what some people in Scotland were rejecting, other people would be glad to have.

**Views of Greenock and Falkirk.**

Greenock Chamber of Commerce has pronounced against the Scheme, but the Town Council has voted in its favour, as also has the Town Council of Falkirk.

# *Notes of the Month*

**Proposed Institute of Shipping Agents.**

It is proposed to form an Institute of Shipping and Forwarding Agents with branches at the chief ports in this country.

**P.L.A. Anniversary.**

On March 31st the Port of London Authority had been in existence for 35 years. It was inaugurated on April 1st, 1909, under the terms of the Port of London Act.

**Harbour Appointment at Baltimore.**

Mr. Henry C. Perring has been appointed harbour engineer and head of the Bureau of Harbours of the department of Public Works, Baltimore, Maryland, U.S.A.

**New Wharf at Sydney, Nova Scotia.**

Under contract with the Dominion Construction Corporation, Ltd., of Toronto, Ontario, a new wharf is under construction at the port of Sydney, Nova Scotia, at an estimated cost of 500,000 dollars.

**Extension of Powers of Graving Dock Company.**

The Articles of Association of the London Graving Dock Company, Ltd., have been altered so as to enable the Company to construct, repair and service flying boats and other aircraft. The Company own and operate two graving docks with ship-repairing and engineering works at Millwall, London, E.

**River Wear Commission.**

At the Meeting of the River Wear Commissioners on March 15th, Sir Frank Nicholson was re-elected Chairman for the ensuing twelve months, and Mr. T. W. Greenwell, vice chairman. Mr. G. A. Short was elected a commissioner to represent the shipbuilders, in succession to his brother, Mr. T. S. Short, who has resigned.

**King's Lynn Docks and Railway Company.**

The net revenue for 1943 is reported to amount to £5,114 (£6,874), which, with the balance brought forward of £183 and £1,500 appropriated from railways compensation account, makes a total of £6,797. Debenture interest, £6,705, has been paid, leaving a balance of £92 to be carried forward.

**Condition of Mullion Harbour.**

The deterioration of the harbour at Mullion was considered at the meeting of the Cornwall Sea Fisheries Committee on March 15th. The Fishery Officer reported that the harbour was getting "worse and worse" through sheer neglect and that it would cost more than £1,000 to put it right. It was decided to write to the District Council on the matter and also to the owner (who purchased it in 1928), urging that in the interests of the public and the fishermen, the harbour should be repaired.

**Strike of Dock Labourers at Glasgow.**

On March 7th strike action was decided on at a mass meeting of dock workers, members of the Scottish Transport and General Workers Union in conjunction with the Municipal and General Workers Union, on a matter which was essentially a domestic dispute. The Regional Port Director for Scotland, who intervened, was unable to prevent arbitrary action on the part of the men which has spoiled the good record established on the Clyde over two years of war-time operation.

**Dock Improvements on the Tyne.**

At the Annual Meeting of the shareholders of Messrs. Smith's Dock Company, Ltd., held in Newcastle, Mr. Lancelot E. Smith, the Chairman, stated that the various departments of the undertaking had been working during the past year to full capacity and that conditions looked like being continued during the present year. Further extensions and improvements were now in hand at North Shields and South Bank which would enable the Company to cope with increasing demands and be of material advantage for the future.

**Peterhead Harbour Trust.**

Mr. Peter Buchan has been appointed to fill a vacancy in the rate-payer class on the Board of Trustees of Peterhead Harbour.

**Resignation of Port Secretary.**

The resignation of Mr. Lawrence J. Keefe, Secretary to the Port of New York Authority, by reason of ill-health, took place on 1st January last after 17 years service.

**Sunken Ships as Substructures for Landing Stages.**

The difficulty of providing landing facilities in the bombed harbour of Naples was in part overcome by building landing stages over the partly sunk ships which had been employed by the Germans to block the port.

**Retirement of Harbour Master.**

It was intimated to the Inverness Harbour Trust at their last meeting that Captain Donald Munro, who has been harbour master for over forty years, had resigned. It was agreed to appoint Captain Munro to the post of consultant harbour master and to advertise the post.

**General Montgomery Visits London Docks.**

After four days inspection of Canadian contingents in the North of England, General Sir Bernard Montgomery paid an official visit to the docks of the Port of London Authority. He was given an enthusiastic reception by the workmen.

**Southampton Customs Appointment.**

Mr. Albert Ells Roberts has been appointed Higher Collector of Customs at Southampton in succession to the late Mr. Charles Nicholls. Mr. Roberts has spent 36 years in the Customs service, including four years in Germany at the conclusion of the last war.

**Mersey Docks and Harbour Board Appointment.**

Mr. John Brining Roberts has been appointed Treasurer of the Mersey Docks and Harbour Board in succession to the late Mr. W. E. Moseley. Mr. Roberts, who is 47 years of age, was appointed assistant to the Treasurer in 1939, prior to which he had been attached to the General Manager's department for 26 years.

**Retirement of Tyne Master Pilot.**

Mr. William Marshall, pilot master, of South Shields, has just retired from the service of the Tyne Pilotage Authority. He is 71 years of age and has been 52 years with the Authority, with whom he served an apprenticeship, starting at the age of 19. After filling a number of subordinate posts, he was appointed pilot master in 1932.

**Developments at Danish Port.**

A scheme of post-war port improvements estimated to cost 1,8000,000 kroner has been approved for the port of Skive, Denmark. A new harbour basin with some 500 lin. metres of quayside is to be constructed. A condition of the project is that navigation between the Limfjord and the west is to be kept open. This means that the Thyboroen Canal is to be maintained in navigable condition.

**Port Authority for Vienna.**

A Port Authority for the Vienna district has recently been established under the designation of Gesamthafenbetrieb in Reichsgau, Wien. It comprises all port undertakings within the area and is regarded as the employer of all port workers who are not in the permanent employment of a private port undertaking; in particular, packers, quayside workers, warehousemen, cranes drivers and stevedores. Management expenses are to be shared by the various private undertakings. Participation in port work is dependent upon possession and production of a valid labour permit issued by the Gesamthafenbetrieb.

# *Free Ports*

By LORD REA.

Free Ports are a survival from old times, and in view of the vast expansion and complication of modern international trade they can hardly be said to retain to-day more than a sectional interest. The characteristic of a Free Port is that some area around the harbours of a maritime town has been staked out and fenced in, and that within this space traders and transporters are allowed to receive imports and despatch exports free from taxation upon the goods so handled.

### Old Time Antipathy to Imports.

At various times in the middle ages and in even earlier centuries, hostility to imports was widely prevalent in European

The Right Hon. LORD REA.

countries. In the manner of those who long afterwards were called mercantilists, people believed that wealth consisted of "money"; that the export of goods led to the receipt of money; that imports were paid for by parting with money; and that therefore it was important to obstruct and check the squandering of a country's wealth on the importation of foreign merchandise. Prompted by this theory many countries imposed such drastic restrictions on imports that in course of time there was a real danger of the entire collapse of foreign commerce. With the object of avoiding this calamity certain enterprising countries or rulers of countries decided to exempt some of their seaport towns from the restrictions by placing them nominally outside the customs frontier of the country. These harbour towns thus became "free ports."

### Some Early Free Ports.

A score or two of such Ports have flourished in Europe from time to time during the past five hundred years. The most notable among them fall geographically into two groups, one group tucked up in the northern corners of Mediterranean waters, and the other far away across the continent spread about in and around the approaches to the Baltic Sea. The former group includes Leghorn, high up on the western shore of Italy, and Trieste and Fiume in the loop of the Adriatic. In the second group there are the important towns of Copenhagen, Stockholm, Gothenburg, Hamburg, Bremen, and Emden more or less around the approaches to the Baltic, and Stettin and Danzig farther eastward along its coast.

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It may be noted in parenthesis that Singapore and Hong-Kong do not come strictly within the subject of these observations. They are no part of protectionist countries selected by those countries specifically for relief from tariff restrictions. They are towns and harbours ceded to Great Britain, and on that account they share the normal features of the British fiscal system.

### Free Port Regulations.

The detailed arrangements and regulations in European Free Ports have varied considerably from place to place. The general rule is that import and export duties are not levied within the free area. Ships can come in and go out, unload and re-load without fiscal interference. In the course of these processes commercial and financial business can be transacted, and this is often permitted. In some cases structural and even certain manufacturing work is allowed inside the customs barriers, but neither goods so treated nor any other goods may pass through the boundary to the hinterland unless taxes, on one scale or another, are paid.

Thus the chief general advantage created by the system falls to the re-export trade. Miscellaneous consignments can be unloaded, sorted, re-packed and despatched in diverse loads to various new destinations. It has been claimed that on this account Copenhagen is the quickest and cheapest port of call in northern Europe and in many respects the most convenient centre for the Baltic trade. The free port of Danzig was recast and developed in recent times precisely in order to compete more successfully with Copenhagen in this respect.

It should be clearly realised that the very name "Free Ports" is a misleading title. These Ports are not free gates of entrance to the protectionist countries behind them. Such freedom as they possess applies only to themselves. Perched on the borders of protectionist countries, they are isolated and confined patches within which certain secondary transactions can take place during the transport of goods. The goods are not free to reach the consumer, which is the sole reason for their existence; they are free only to rest for a while on the way and possibly to have their ultimate destinations reconsidered and redirected.

This is not to say that Free Ports have no value. They are undoubtedly an encouragement to shipping, a convenience to transporters, and indirectly a benefit to some scattered groups of consumers. All fiscal restrictions upon the safe and speedy delivery of merchandise to consumers are bad. Free Ports temporarily diminish or suspend some of the restrictions imposed by protectionist tariffs, and to the extent to which they do this they afford a little help to trade.

### Advantages of Free Trade.

But what a pitiful piece of self-contradiction appears in the very nature of the system! The creation of these special ports is itself a confession that protective tariffs impede trade and particularly the important and profitable trade of re-exports. Whatever success the system can show is the result of a limitation of tariff burdens, and is thus automatic tribute to freedom of trade.

And what a small matter the whole thing is when all is said! Scattered over the world we have these tiny groups of little fluttering lights of trading wisdom, struggling efforts here and there to open the way for a step or two towards prosperity and plenty. Why trifle any longer in these narrow by-ways? It is surely not to any such random and piecemeal treatment of international trade that the world is moving. We are moving more in step with the Atlantic Charter which proclaims, as one of the aims of the United Nations after the war, the "enjoyment by all states, great or small, victor or vanquished, of access on equal terms to the trade and to the raw materials of the world."

# Tidal Levels of the Thames

## The Origin and History of Trinity High Water

By Wm. B. HALL, M.Inst.C.E.*

(*Continued from page 265*)

### Old London Bridge.

In the early years of the nineteenth century not only were London Docks under construction but West India Docks and East India Docks at Blackwall, while mooring projects were being considered for the improvement of the Port.

In the various hydrographic surveys and tidal observations made then, Trinity Low Water was commonly used as the datum of soundings and it was not until 1820 that a high water level came into use.

It is curious to reflect that Trinity High Water, as we know it, originated not through the action of the Trinity House or the needs of the navigators but from the arbitrary choice, by John Rennie, of a datum level for his work on London Bridge.

Old London Bridge, built in the 12th century, broken down, falling down, burnt, built upon, altered and threatened, surely had a history as chequered as the history of a bridge could be.

At the end of the eighteenth century it was recognised as a serious hindrance to the development of the Port of London. The navigation of its arches was dangerous owing to the restricted water way and consequent rapid currents but although the Parliamentary Report of 1799 dealt with it, it was not until 1831 that it was finally pulled down, on the completion of the present bridge.

In 1814, 1820 and later, the Bridge House Estates Committee of the City Corporation investigated the matter fully and from their records the following may be quoted.

On 10th August, 1820 it was "resolved that it be referred to the Clerk of Works, Mr. John Rennie, Mr. William Chapman and Mr. James Mountague (Superintendent of the Works) to consider and report whether the mode of enlarging the waterway under London Bridge recommended by Messrs. Dance, Chapman, Alexander and James Mountague in their report dated November, 1814, will be, in their opinion under all the circumstances of the case with reference to expense and subsequent stability more expedient than the erection of a new bridge."

On 8th September, 1820 "Mr. James Mountague delivered in a letter addressed to him by Mr. Rennie requesting observations to be made on the height of the River at high and low water above and below London Bridge during a stated period which was read in these words:—

London, August 12th, 1820.

Dear Sir,—I received Mr. Newman's letter of yesterday's date together with the Resolutions of the Select Committee of the Bridge House Estates appointed to consider the best means of remedying the inconvenience occasioned by the contracted state of the waterway under London Bridge held at the Guildhall on Thursday the 20th day of August, 1820, wherein I learn that I am appointed amongst others to consider and report whether the mode of enlarging the waterway under London Bridge, recommended by Messrs. Dance, Chapman, Alexander and James Mountague will be in our opinion under all the circumstances of the case with reference to the expense and subsequent stability, more expedient than the erection of a new bridge.

Now as this reference embraces a very wide range it will be necessary that various information should be procured previous to our consideration of the subject referred to us and among others full and accurate information as to the Tide above and below London Bridge. For this purpose one graduated gauge should be fixed above London Bridge and another below it. Perhaps one of the piers of Southwark Bridge would be a suitable place for the gauge above London Bridge and one of the piles somewhere about Billingsgate—from whence the Tide does not ebb, for the lower gauge. The Zero of both gauges should be on the same level and persons should be appointed to take the mark of high and low water on both gauges at each Tide noting the time at which such high and low water takes place with the age of the moon and direction and kind of wind and which will also show the full rise of Tide at both places between Low and High Water. These observations should be continued from one full moon to another or from one change to another.

As to the other points of information required I shall submit them to the gentlemen who are associated with me and if they agree a report will be made concerning them.

I am, dear Sir,

Your most humble servant,

JOHN RENNIE.

And Mr. Mountague reported that he had given the necessary directions to Mr. Kitching (Tide Carpenter at London Bridge) to make the necessary alterations.

A letter from Mr. Rennie and Mr. Chapman requesting observations to be made in the height of the river at high and low water at the entrance to the London Docks and at other places was delivered in and read in these words:—

To the Worshipful Committee for letting the Bridge House Estate

Gentlemen,—Before we conjointly with the other gentlemen who have been appointed take into consideration the matter you have been pleased to refer to us relative to London Bridge, we conceive it necessary that a surveyor be employed to take a correct horizontal line corresponding with **two feet above the level of the average Spring Tide Mark** on the entrance to the London Dock as ascertained by the Elder Brethren of the Trinity House and that this line or level be marked on London Bridge, the Southwark Bridge, Blackfriars, Waterloo and Westminster Bridges and that from this level so marked the height of the water at high and low water during one moon together with the respective time being taken at not less than 50 yards above and below these bridges and also at the gauge marks at the entrance of London Docks.

And likewise that transverse sections under each of the said bridges be taken with reference to the aforesaid line of level two feet above the average spring tide on the entrance of London Docks.

We are, Gentlemen,

Your obedient Servants,

JOHN RENNIE,

Wm. CHAPMAN.

Newcastle,

31st. August, 1820.

Whereupon it is ordered that Mr. James Mountague do cause the several observations required by Mr. Rennie and Mr. Chapman to be made.

Examined, R. L. Newman, Comptroller.

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†Paper submitted to the Institution of Civil Engineers and published in abstract in the Journal of the Institution. Reproduced by permission.

*Chief Draughtsman, Port of London Authority.

## *Tidal Levels of the Thames—continued*

On 20th December, 1820, Mr. James Mountague reported that the observations had been made and that Mr. Kitching's expenses amounted to £90. The datum finally chosen was the Spring Tide Mark and not a level two feet higher.

### Origin of Trinity High Water.

It is probable that the levelling from Hermitage Entrance was carried out by Mr. Francis Giles, Surveyor and that the marks made by Mr. Kitching were the well-known Roman capital letters T.H.W. and T.H.W.D. cut in various places between London Docks and Westminster. One may still be seen on the entrance to the Traitor's Gate at the Tower of London (fig. 4).

Fig. 4.

On 12th March, 1821, Mr. Rennie and the engineers associated with him submitted a report from which the following may be quoted:—

"We have hereunto annexed as an appendix an abstract of the results of such observations premising that therein and in this our report in speaking of high water spring tides we mean the average spring tide high water at the Hermitage Entrance to the London Docks as settled pursuant to the Act of Parliament, by the Corporation of theTrinity House in August 1800 and which **level line has been marked** and the tidal observations made at all the bridges from London to Westminster inclusive.....it will be seen that the average level of high water spring tides is six inches under the datum of the Trinity House, below London Bridge and one foot two inches under the datum above bridge; whereas until these levels and sections were correctly made it was the generally received opinion that the difference of level was two feet and it is so considered in the report of 1814."

It has already been shewn that the 1800 Act did not require High Water to be fixed and that the Marks set up by the Trinity House were probably arbitrarily chosen. The Hermitage Mark may nevertheless be considered quite a suitable datum for these observations.

### Levels at Old London Bridge.

Before concluding this section reference may be made to the Parliamentary Report of 1799, on the Port of London, in which there was reproduced a fully dimensioned drawing of the old bridge by Mr. George Dance, the Surveyor, and from this may be recovered the levels of the tides and of the various parts of the bridge at that date.

Mr. Dance related his dimensions to the top of the sub-plinth of the Monument erected in Thames Street to commemorate the Great Fire. About 1850 a bench mark was cut by the Ordnance Surveyors 4½-ins. below the same point and a value given as 36.67-ft. above Ordnance Datum. An examination of later values suggests that the Monument between 1799 and 1939 has settled about 6-ins. and therefore, from the recent value given for this bench mark (35.19-ft. above Newlyn Datum) the original levels may be calculated. The figures are in feet above or below Newlyn Datum, assuming this datum to have been in existence in 1799.

| | | |
|---|---|---|
| High Water of "Common Spring Tide" | ... | +10.82 |
| Low Water of do. | ... | − 8.93 |
| Range of do. | ... | 19-ft. 9-ins. |
| High Water of "Common Neap Tide" | ... | + 6.82 |
| Low Water of do. | ... | − 4.18 |
| Range of do. | ... | 11-ft. |
| Extraordinary high tide ... ... ... ... | | +15.82 |
| Extraordinary low tide ... ... ... ... | | −13.93 |
| Highest point underneath the Great Arch that is the highest point for navigation ... ... | | +26.32 |
| Highest point in the footway at the east side of bridge over the Great Arch ... ... | | +32.07 |
| Zero of the tide gauge on the Water Works at the 4th arch from the North End of Bridge ... ... ... ... ... ... | | − 5.18 |
| Top of sub-plinth of Monument ... ... | | +36.07 |

The Great Arch which was opened out by Smeaton in 1767 had about 12-ft. less clearance than the present bridge.

### Tidal Observations at London Dock.

When the construction of London Dock was commenced in 1801 Mr. William Vaughan instituted a series of tidal observations at Wapping Entrance which continued with certain intervals until 1836. The original records of these observations which are now in the possession of the Royal Society form an interesting note on the early days of the London Dock.

From the 25th August, 1801, to the 16th March, 1805, only high water was recorded. No reference is made to the datum of the readings or to low water until 17th March, 1805, when low water is given above or "below Trinity Mark" with the explanation added "Five foot mark." Later the reference is simply to "Trinity low water mark" and no mention is made of Trinity High Water throughout the records.

It might be supposed that these heights were measured at Captain Huddart's mark at Bell Dock, just alongside Wapping Entrance, but Mr. James Elmes in his Guide Book (1842) states erroneously they were taken at the Upper, that is, Hermitage Entrance (not completed until 1820).

From the 1st January, 1806, both high and low waters are recorded as from the sill of the entrance, that is five feet below Trinity Low Water and twenty-three feet below the surface of the dock water. The heights in feet are cut in the masonry of the entrance lock, (figure 5).


Fig. 5.

The first vessels to enter the docks were given as:—

February 6, 1805, afternoon tide, barge "Benjamin" with wines.
February 7, 1805, morning tide, the "Elizabeth" with gin.
,, evening tide, the "Choice" with wines.
,, evening tide, barge "Rachel" with brandy.
,, evening tide, boat "Jane" with brandy.

There are nine volumes of these records and the last volume has a note that they were presented to the Royal Society by order of J. Solly, Esq. Sir John Lubbock made use of them when he prepared his famous papers on tides, printed in the Philosophical Transactions in 1831 and later.

## *Tidal Levels of the Thames—continued*

An analysis of these observations cannot be made in these pages but the following comments may be made:—

(1) From Captain Lloyd's paper it appears that Sir John Lubbock supplied him with certain results, one being that high water of spring tides was 4½-ins. below the XXIII mark at Wapping Entrance.

(2) Commander Burstal, commenting upon Mr. Redman's paper on the River Thames, given before the Institution of Civil Engineers in 1877, says:—

"When the Admiralty survey of the River was undertaken by Commander Bullock in 1830, the first thing done by him was to establish a standard low-water zero to which to reduce his soundings. This he attained by means of spring tides of, he believed, 25 years and he found that zero was 3-ft. 3-ins. on the index over the sill of the Wapping Entrance to the London Docks. The high water (Trinity Standard) at the place was XXIII feet on the index, the difference between low-water and high-water springs being 19-ft. 9-ins. **and not 17-ft. 10-ins.** as was reported to Mr. Lloyd."

When the chart was published a note was added:—

"Datum low water average springs—3-ft. 3-ins. on the tide gauge at the Wapping Entrance to London Docks or **19-ft. 8-ins.** below Trinity High Water Mark."

The discrepancy of 1-in. may have arisen from the mark at Hermitage Entrance being so much below the figure XXIII on the index at Wapping Entrance, or from the fact that Captain Huddart's original mark at Wapping was also 1-in. below the XXIII feet mark.

(3) Practically all the tidal records at Wapping were kept by Mr. William Pierce and in 1827 he compiled a list of the highest tides at Wapping between 1801 and 1827 and these may be placed on record here.

London Dock, 14th November, 1847.

Extract from the Register of all the tides of Twenty-Five feet and upwards taken from the marks on the Entrance Lock commencing August, 1801.

| Date | Height | | Time | | | Moon's Age | Wind | Prevailing Wind. Previous |
|---|---|---|---|---|---|---|---|---|
| | ft. | in. | | hr. | min. | | | |
| 1806 Dec. 26 | 25 | 6 | p.m. | 2 | 0 | 17 | West | S.W. strong Breezes, much Rain |
| 1807 Sept. 30 | 25 | 5 | ,, | 12 | 0 | 29 | N.W. | W. to S to W.S.W. |
| 1810 Nov. 10 | 25 | 3 | ,, | 1 | 0 | 13 | E.S.E. | N.N.W. to East |
| 1810 Dec. 28 | 25 | 0 | a.m. | 2 | 50 | 3 | N. | S.W. to W.N.W. |
| 1812 Mar. 16 | 25 | 0 | ,, | 3 | 50 | 3 | N.E. | N. to N.E. |
| 1812 Oct. 21 | 25 | 1 | ,, | 2 | 0 | 16 | N.W. | S.W. to W. |
| 1812 Oct. 21 | 25 | 8 | p.m. | 2 | 10 | 16 | N.W. | S.W. to W. |
| 1812 Nov. 19 | 25 | 4 | a.m. | 1 | 45 | 15 | N. | E. to N.E. |
| 1813 Mar. 7 | 25 | 3 | ,, | 5 | 0 | 5 | W. | W. |
| 1814 Dec. 28 | 25 | 6 | ,, | 2 | 50 | 17 | N.E. | N.E. |
| 1815 Dec. 30 | 25 | 4 | p.m. | 2 | 0 | New Moon | N.W. | S.W. |
| 1816 Feb. 17 | 25 | 5 | a.m. | 4 | 30 | 19 | N.W. | S.W. |
| 1816 Mar. 16 | 25 | 4 | ,, | 3 | 30 | 17 | S.S.E. | S.W. |
| 1816 Oct. 21 | 25 | 2 | ,, | 2 | 15 | 1 | W.N.W. | N.W. to S.W. |
| 1816 April 13 | 25 | 0 | p.m. | 2 | 45 | 16 | N.W. | S.W. to N.W. |
| 1818 April 23 | 25 | 5 | ,, | 3 | 45 | 18 | N.E. | E. to N.E. |
| 1821 Dec. 28 | 25 | 10 | ,, | 4 | 15 | 4 | E.S.E. | S. to S.E. |
| 1822 April 24 | 25 | 2 | a.m. | 3 | 20 | 4 | S.E. | S. to S.E |
| 1824 Sept. 26 | 25 | 2 | ,, | 3 | 50 | 5 | N. | N.W. to W. |
| 1824 Dec. 23 | 25 | 11 | ,, | 3 | 10 | 4 | N.W. | S.W. to S.S.W. |
| 1825 Feb. 3 | 25 | 6 | p.m. | 2 | 0 | 16 | S.W. | S.W. |
| 1825 Feb. 4 | 25 | 9 | ,, | 2 | 35 | 17 | N.W. | S.W. |
| 1825 Feb. 5 | 25 | 3 | ,, | 3 | 10 | 18 | N.W. | N.W. |
| 1825 Feb. 6 | 25 | 5 | a.m. | 3 | 40 | 18 | W. | N.W. |
| 1825 Nov. 11 | 25 | 2 | ,, | 1 | 55 | 2 | N.N.W. | S.W. to N. |
| 1827 Oct. 31 | 26 | 0 | p.m. | 11 | 25 | 12 | N.W. | N. to W.S.W. |

Wm. Peirce.

### Local River Surveys 1800—1850.

During this period several surveys of different portions of the river were made, using **Trinity Low Water** as the datum of soundings and after 1820 reference was frequently made to Trinity High Water.

(1) The Area of the river opposite Blackwall Point was troublesome and dangerous owing to Blackwall Rock.

In 1806 this area was surveyed and soundings given to "Trinity House Low Water Mark."

In 1808 it was again surveyed and the datum was "Low Water Mark by Trinity Standard."

In the same year a further survey was made by Messrs. Mylne, Rennie and Huddart and soundings were reduced to "Low Water by Trinity House Standard."

(2) In 1813 Rennie and Mountague designed some alterations to the mooring chains off the Blackwall Entrance to the West India Docks and state:—

"The soundings on this plan are reduced to Low Water by the Trinity Standard but the tide occasionally ebbs out 1-ft. 6-in. lower than the Standard and is known to have ebbed 3-ft. 6-in. lower.

N.B. The 6-ft. Mark upon the Wing Wall of the Canal is the Trinity Standard for Low Water.

(3) Captain Pickering in 1825 surveyed the Pool of London and submitted his results to the Parliamentary Committee on the St. Katherine Dock Bill.

"Soundings.....are reduced to the level of low water spring tides by the Trinity Standard.....that is the average tide **not** the low spring tide."

(4) In a survey over Thames Tunnel at Wapping by Francis Giles in 1824, the Hermitage Stone is described and both High and Low Water Marks are referred to. It was probably Francis Giles who surveyed the River near London Bridge for John Rennie in 1820.

(5) In 1846 Mr. May surveyed Limehouse Reach and the datum used was 17-ft. 10-in. below Trinity High Water. In the following year he surveyed the Pool off Hermitage Entrance and the datum was 18-ft. below Trinity High Water.

These figures show the apparent confusion between the 17-ft. 10-ins. of "Hermitage" inscription and the 18-ft. standard tide of Wapping, as well as general confusion in the so-called Standard Tides.

### Captain Lloyd—1831.

In 1830 the Royal Society suggested to the Admiralty that an accurate survey should be made to determine the difference in water level between Sheerness and London.

Captain John Augustus Lloyd, R.N., F.R.S., who had achieved distinction by levelling across the Darien Isthmus a few years previously, undertook the work, and in 1832 a full account was published in the Philosophical Transactions, and the level books were placed in the custody of the Society.

The work was done with great care and precision and, while the ultimate result aimed at was not conclusively reached, prob-

## *Tidal Levels of the Thames—continued*

ably through lack of funds necessary for prolonged observations at London, the long chain of points levelled between Sheerness and London, admits of some comparison between levels as they existed in 1931 and now.

At Sheerness Dockyard Captain Lloyd established several permanent standards which he connected by levelling to the mean sea level observed on his tide gauge. He then chose the "North Standard" at the entrance to the Boat Basin as his Zero and from there proceeded to level various points on a line through Kent to Greenwich, proceeding thence across the River to the Isle of Dogs, Limehouse, Wapping, the Tower of London and to London Bridge.

The writer has tabulated a few of the levels, giving first the height above or below zero at Sheerness and secondly the calculated height above Newlyn Datum. In order to connect these values the "North Standard" is assumed as at a level in 1831 of 13.50-ft. above Newlyn Datum.

| | Lloyd | Newlyn |
|---|---|---|
| 1. Sheerness Dockyard, North Standard. A brass standard at Entrance to the Boat Basin ... | 0 | + 13.50 |
| 2. Queenborough Castle. A brass standard in granite block founded on chalk. ... ... ... ... | + 10.6029 | + 24.10 |
| 3. Gravesend Pier. A brass standard inserted in a granite stone on eastern side of the pier, protected by a brass plate. ... ... ... | − 0.1828 | + 13.32 |
| 4. Erith Church. A mark placed on an ancient brass in the Wheatley Chapel. (It is probably on the tomb of Emma Wode, 1471, and has been hidden for many years under the altar). ... ... ... | − 1.5669 | + 11.93 |
| 5. Woolwich Arsenal. A brass standard. ... ... ... ... | + 1.2019 | + 14.70 |
| 6. Greenwich Observatory. A small brass standard underneath the transit at Greenwich Observatory. | + 140.6897 | + 154.19 |
| 7. Greenwich Hospital. A small brass standard on the plinth of the statue of George II. ... ... | + 5.1157 | + 18.62 |
| 8. City Canal, Limehouse. Trinity High Water Mark on the entrance lock at the west end of the canal, south side. (Present value 11.41-ft. Newlyn Datum). ... | − 1.9438 | + 11.56 |
| Mark indicating a particularly high tide in 1827 (21st Nov.).* ... | + 1.3806 | + 14.88 |
| 9. West India Dock, Limehouse, Figure XXIII on south side of entrance. ... ... ... ... | − 1.0349 | + 12.47 |
| 10. Regents Canal, Limehouse, Figure XXI on west side of entrance ... | + 0.2110 | + 13.71 |
| 11. London Docks, Wapping, Figure XXIII on west side of entrance "which answers to Trinity High Water" (present value 11.18 Newlyn Datum) ... ... ... | − 2.0112 | + 11.49 |
| An iron plate or mark on quay near index ... ... ... ... | + 3.7570 | + 17.26 |
| 12. St. Katherine Docks, Figure XXVIII on west side of entrance "upon a level with.....Trinity High Water." ... ... ... | − 1.9420 | + 11.56 |
| 13. Old London Bridge. Trinity High Water Mark on west side of bridge. ... ... ... ... | − 2.1621 | + 11.34 |
| 14. New London Bridge. A standard sunk in the large plinth of the landing place (near the wall) of the stairs on the north east side. (Trinity High Water mark was not placed on the new bridge until 1850). | − 2.3967 | + 11.10 |

*On 31st October, 1827, a very high tide breached the works at St. Katherine Dock Entrance then under construction.

It will be observed that no level was taken at the Hermitage Stone but Captain Lloyd apparently knew of it for he stated:—"No observations have been made on low-water mark; but from the Trinity mark it appears the spring tide low-water mark is considered to be 17-ft. 10-ins. below Trinity mark, or rather below the high-water mark."

The inaccuracy of the Trinity High Water marks along the river, which will be commented on throughout this paper, was apparent as early as 1831 "Finding so great a difference between the marks at the City Canal, London Docks etc., and that at London Bridge, I levelled again.....but found the same results."

### Further Tidal Observations.

In 1828-9 observations were made at the old entrance to Regents Canal and the results were mentioned by Captain Lloyd. Mean Spring Tide High Water was found to be 19-ft. 3-ins. at the canal entrance or 6-ins. above the level of the XXIII on the index at Wapping Entrance.

Reference has already been made to the observations of Rennie at London Bridge in 1820. Further observations in 1822 and 1823 shewed that high water of spring tides at London Docks was from 3 to 9-ins. above Trinity High Water at Hermitage.

In a little book of Dock Acts, in the possession of the Port of London Authority, there is found a note on a double tide which may be repeated here:—

Friday, 28th October, 1836.

| | |
|---|---|
| High Water at Wapping Entrance at 1 a.m. | 22-ft. |
| ebbed till 10 minutes past 2 a.m. depth | 20-ft. 4-in. |
| and then flowed again until 55 minutes past 3 a.m. depth | 22-ft. 2-in. |

### The Thames Navigation Committee.

The Thames Navigation Committee of the City Corporation had authority in all river matters during the first half of the century, until superseded by the Thames Conservancy Board in 1857.

### Low Water Marks—1838.

In 1838 Mr. James Elmes, the Surveyor to the Committee, set up granite stones at various places to mark Trinity Low Water. In his Guide Book to the Port, published in 1842, he states:—".....the insertion into the bed of the River, on both sides, of flat stones indicating low water below this standard (Trinity High Water). These stones seldom mark that standard, the tide sometimes not leaving them bare and sometimes leaving them exposed for half an hour and sinking horizontally below them."

In a report of 1838 to the Navigation Committee Mr. Elmes wrote:—

"The operation of taking the necessary levels of the Trinity High Water Marks to ascertain the low water by the same standard for the purpose of fixing the low water mark granite stones as ordered by your Worshipful Committee in May last, have been completed by me and my assistants aided by Mr. Marshall and his boatmen. We have also begun fixing them in their proper places.

"The operations have been necessarily tedious from the circumstance of the Trinity Marks as required by the Act..... being so few and far between and also distant from the places where they were ordered to be inserted and specially from the accuracy required to prevent the disputes about the line or height of low water mark which that Act was framed to obviate.

"The fixing of the stones is more tedious from the circumstance of low water lasting so short a time for us to insert them at low water mark.

"As the spring tides are now on, Mr. Marshall and myself are at Blackwall, fixing the marks that we may not lose so good a tide as occurs today." (4th October, 1838).

Needless to say there is now no trace of these stones, and the report suggests some confusion of thought.

In the same year the Committee issued Bye-laws for the Port of London including regulations for the Harbour-Masters. Bye-law No. 13 stated:—

".....Harbour-Masters shall within the limits of his station from time to time, and also whenever required by the said Com-

## *Tidal Levels of the Thames—continued*

mittee take soundings at low-water mark, according to the Trinity House standard and report the same....."

### Trinity High Water Iron Plates 1853.

In February 1853 Mr. Stephen Leach, Engineer to the Navigation Committee submitted an estimate for the erection of 99 iron plates at various points on the river. A pamphlet published in 1854 gives the location of 57 plates erected between Chelsea and Woolwich and of these the following are still in position:—

Nine Elms, Wharf.
Millbank Prison, Landing Steps.
Paul's Wharf, Upper Thames Street.
Southwark Bridge, South Abutment
Humphery's Wharf, London Bridge.
Hermitage Dock, Entrance.
Wapping Dock, Entrance.
Deptford Dockyard, Stairs.
Deptford Creek, General Steam Navigation Co.'s Wharf.
Port of London Wharf, Millwall.
Mowlem's Wharf, East Greenwich.
Trinity Wharf, Poplar.
Woolwich Dockyard, Wharf.

Most of these plates are of cast-iron 12-in. deep and 6 in. wide with the City shield and letters T.H.W. over a broad arrow, as in figures 5 and 6, which shew the plates at Wapping Entrance and at Hermitage Entrance.

Two plates, at Woolwich and Deptford Dock yards are slightly different, the City shield being omitted. Two of a larger size 16-in. deep by 11½-in. wide were removed from the entrance of the City Canal about 1894, and are now in the possession of the Port of London Authority. These plates, which are shewn in figure 7 may have been fixed at some earlier period between 1820 and 1853.

In 1853 Mr. McDougal Smith, Westminster, made a survey of the river between Battersea Bridge and Woolwich. This beautifully executed survey gives transverse sections of the river bed at frequent intervals and the levels of many points with reference to the Trinity High Water Marks at Hermitage Entrance. The new plates had been set level with the Hermitage Mark and afterwards checked back to adjacent Ordnance bench marks which had recently been completed. It was found that, if the published values of the bench marks were correct, the T.H.W. marks were considerably in error and varied from 11.50-ft. to 12.58-ft. above Ordnance Datum.


Fig. 6.

It is obvious that a system of "marks" with errors of the order of a foot or more was useless for any serious purpose and accordingly Mr. Stephen Leach, Engineer to the Committee, wrote to the Director General of the Ordnance Survey:— ".....the level of Trinity High Water has recently been marked upon several of the wharves and dock entrances on the Thames between Battersea Bridge and Woolwich for the information of parties interested in the navigation of the river and the waterside premises. Several discrepancies have been noticed between the levels taken for this purpose and those recorded on the maps of the recently executed Ordnance Survey. As the difference at some points is considerable, and as the levels in each case are made public it is probable that the discrepancy will be noticed and the Committee have, therefore, thought it right that you should have the earliest information of the fact. I enclose a


Fig. 7.

statement which shews the discrepancies I have referred to and I shall be happy to supply you with the check levels at any of the points mentioned if you should wish to have them tested. The datum adopted for our survey is 100-ft. below the **recognised standard Trinity High Water Mark,** namely that at the Hermitage entrance of the London Docks. The levels have been taken with the greatest possible care by Mr. McDougall Smith....."

The Superintendent of the Ordnance Survey replied as follows: ".....In carrying on a lengthened series of levels by different persons and by a perfectly independent process **small** differences in the results must be expected, especially when the levelling has to be taken through the streets of London, but many of the discrepancies shewn in the statement forwarded with your letter are very unsatisfactory. There is, however, from the system of checks adopted, no apprehension entertained by this Department of the possibility of errors at all approaching to the amount indicated. But if the Committee are desirous that the matter should be investigated, and will furnish this department with a small diagram exhibiting the course of their levelled lines, the ties or checks adopted, and the number of times each line was levelled, Colonel Hall will be enabled to decide whether he should be warranted in taking steps for a further re-examination of the work....." etc.

A plan shewing the line of levels was prepared but it is not known if anything further was done. In this plan 54 plates are indicated as having been placed in position.

*(To be continued)*

# *The Port-City of Toledo, Ohio, U.S.A.*

## *A Potential World Port*

By GEORGE E. HARDY,
Chairman of Ohio Waterways Commission and Member of Executive Committee, Great Lakes-St. Lawrence Tidewater Association.

The Port City of Toledo is located in the north-western corner of the State of Ohio, on Maumee River, at the west end of Lake Erie. The population is a little more than 300,000.

On a basis of port tonnage, Toledo is the second largest port on the Great Lakes and fourth in the United States. On this same basis of port (cargo) tonnage, New York is first in the world. First on the Great Lakes, is the " twin port " of Duluth-Superior-located at the head of the Lakes, at the west end of Lake Superior.

### Shipment of Soft Coal, Ore, etc.

The Port of Toledo is the largest soft coal shipping port in the world. One-half (approximately) of all the soft coal on the Great Lakes is loaded at Toledo Docks. The shipments of soft coal at the port total about 25,000,000 net tons.

Soft coal is loaded into ships at a very rapid rate. A regular performance is about 2,000 net tons per hour—really a little more, rather than less. An old record, made at a Toledo dock is the dumping of 62 car loads in 60 minutes. The cars averaged 55 tons. That performance was more than 3,000 tons per hour.

Only about three million gross tons of iron ore are received per season. Part of the ore received is used in a local blast furnace and the balance moves, by rail, to furnaces in Southern Ohio.

Toledo has become the leading port on the Lakes for the handling of petroleum products. This has developed in the past six or seven years. Each month, about one hundred tankers are loaded in Toledo. Some gasolene is received and some grain comes into this port. Sixty or seventy years ago, this was a leading grain shipping port.

### Annual Trade

The season of navigation is seven and one-half to eight months.

The total Toledo port tonnage rises close on 30,000,000 net tons per annum.

The total port-to-port movement on the Great Lakes is about 90,000,000 net tons.

The present movement has been very greatly increased of late.

The importance of Toledo as a port is obvious. Its future hope, that it will, in time, become a world port of major rank, is predicated on the modernisation of the St. Lawrence River route to the sea, to the seven seas and to the markets of the world. All Great Lakes ports are now, world ports, in a limited way. The " bottle neck " is, and has been for 65 years, the small locks in the canals, in the first 70 miles, west of Montreal. The Port of Montreal, 185 miles from the east end of Lake Ontario and open to navigation for seven-and-a-half months, each year, is a thousand miles from the ocean.

The small locks above referred to, are 265-ft. long, 45-ft. wide and have 14-ft. depth. The unit of cargo, that can negotiate these locks, is 3,000 net tons, or less, too small to fit into the present day water transportation. For years,s small ships have come into and gone out to sea, from these Great Lakes destined to Great Britain, Scandinavian ports, or elsewhere. Profits are small and the business is unattractive.

The Port of Toledo is 601 miles from Montreal. Lake Ontario is approximately 222-ft. above the level at Montreal. Lake Erie is 326-ft. above the level of Lake Ontario.

### The Welland Ship Canal.

The Welland Canal, all Canadian, connects the two lakes. Its seven locks, opened to navigation, eleven years ago, are 820-ft. usable length, 80-ft. wide and 30-ft. deep. The Canal is 25 miles long with Port Colbourne at the Lake Erie end and Port Weller at the Lake Ontario end.

### Administration

The Port City of Toledo has no Port Authority and no long range, scientific port plans, due to the opposition of the many railroads. The railroads own most of the river frontage. Railroad officials lack modern understanding of the workings and results of a real Port Authority. Fearing loss of control of our water front, they have defeated every effort, for the past 20 years, to enact a Port District Enabling Bill.

Toledo is one of the largest railroad centres in the United States. When this older generation of railroad officials have given way to younger men, it is most likely that the younger men will understand that Port Planning, Port Development and Port Management, create more tonnage for the railroads, not less, as many misguided officials fear.

Of course, port business is much more efficiently handled by a Port Commission, plus a Port Engineer, than by a City Council, having a multiplicity of duties and problems and knowing little or nothing about port matters. Credit goes to our railroads and their docks, for Toledo's high rank in the list of ports. However, it is clear to all who have made any study of port planning and the certain results, that Toledo would now be a much greater port if our railroad men had co-operated, instead of blocking our endeavours to establish a Port District-mandatory, because much of the Maumee Bay area is beyond the City limits and therefore beyond the jurisdiction of our City Government.

Too few people understand that everyone buys transportation and that water transportation is the most economical, by a wide margin.

Too few people realise that all forms of transportation are servants of the public and should be forced to co-ordinate and operate in the manner that will effect the greatest savings, for the benefit of the public, *who pay all the costs* of handling and carrying. The ship always goes inland, as far as she can find a sufficient depth of water and a profitable cargo.

Too few people understand that port planning-long range, scientific planning—and the development of port facilities, always attract major industries, engaged in world trade. That means pay roll-added values-city growth. It never fails.*

# *Dublin Port and Docks Board*

## *Chairman's Address*

At the Meeting of the Dublin Port and Docks Board on January 13th last, **Mr. Thomas O'Connor,** the Chairman of the Board, on being reappointed Chairman for a second term of office, gave the following address:—

Having had the honour and privilege of presiding over the Board for the past year, I have pleasure in detailing to you the Board's activities during that time. The World War, now in its fifth year, continues to severely impair the shipping traffic, on which our Board principally depends for its revenue. I therefore, hope and pray that the year we have entered on may see the suffering world again at peace. The chief world industries appear to be the construction of weapons for the destruction of mankind, and no doubt the end of such conditions must be drawing near. Meantime, the only regular overseas shipping service to our Port, is, that of our Irish Shipping Companies, who with commendable enterprise are bringing to our people many essential commodities. Too high a tribute cannot be paid to the personnel of these companies and the brave men who man the ships in such difficult circumstances.

The Graving Dock continued to be a useful source of revenue and the earning from same is much the same as in the previous year.

The Register Tonnage of Vessels which entered the Port during the year shows a decrease of 102,000 tons as compared with last year, while Tonnage Dues collected increased by £2,345.

*Due to war conditions, the quotations in this article are necessarily on a pre-war basis.

## *Dublin Port and Docks Board—continued*

The Revenue derived from Dues Inwards increased by £2,678, while the Receipts from Dues on Goods Outwards decreased by £6,265.

### Labour Regulations.

It will be recalled that with a view to relating maintenance expenditure more closely to revenue, the Board cut down all maintenance work to the bare minimum, and in order to avoid consequent unemployment, introduced a short working week in June, 1940, for a large number of its employees and embarked upon certain works of a capital nature to absorb the rest. In November, 1942, the Board restored the full working week and continued to give the men full time employment during the whole of 1943. This caused a considerable increase in the charges on revenue, and in addition a Bonus of 7s. per week, payable from 5th February, 1943, was granted to the men following the making of a Bonus Order by the Minister for Industry and Commerce. In order to provide the necessary additional revenue the Board sought and the Government made an Emergency Powers Order increasing the maximum rates which might be levied by the Board. These new maximum rates were put into force on 6th September, 1943.

### Rate Increases.

It has been an unfortunate experience that the additional revenue expected to be derived from increased rates has never been obtained from each successive increase made since the beginning of the Emergency . While this has been largely due to causes beyond the control of the Board, it must not be overlooked that there is a point beyond which no additional revenue can be derived by increasing rates. As to whether that point has been reached yet or not the Board may have to express an opinion very shortly.

### Stores Department.

The complete re-organisation of the system in the Engineering Stores Department was undertaken during the year. Good progress has already been made and many notable improvements have been introduced. In the next few months it is hoped the re-organisation will have been completed and the Board will have a system of control over Engineer's Stores on modern lines.

### Postponement of Elections.

The Department of Industry and Commerce was again very helpful during the year in having an Emergency Order made whereby the Elections for Seats on the Board due to be vacated this month were postponed for another year and the term of office of each Member extended by one year.

## ENGINEERING.

### Dredging.

Tonnage dredged showed a slight increase, 1,000,150 tons, compared with 952,020 tons in 1942 and 1,087,940 tons in 1941. In spite of the restricted dredging programme for the past four years the condition of the channel remains generally satisfactory.

The principal fuel used throughout the year was Coal Blocks produced in the Board's factory. While the results obtained were not so good as with steam coal, the use of this fuel has enabled dredging to continue when it would otherwise have been impossible.

Dredging was again carried out at Pigeon House Harbour for the Electricity Supply Board, who provided the necessary coal.

### East Wall Reclamation.

A further two acres were filled by the Corporation during the year. The Department continued the construction of the new surface water sewer outfall for the Corporation.

### Custom House Quay.

The second section of the quay wall, making a length of 218 feet, was finished and cofferdamming and excavation of a third section completed. Concreting has commenced but work has been delayed by difficulties experienced.

The new transit shed has been practically completed for a length of over 100 feet and a further section is under construction.

### Ballast.

The demand for ballast has again been very large.

### Transport of Coal.

A large quantity of coal has been transported to Pigeon House Harbour for the Electricity Supply Board by the Board's barges and tugs. Facilities have been provided for Irish Shipping, Ltd., for bunkering at Alexandra Quay.

### Cranes.

The demand for cranage has been maintained, hours worked showing little change compared with 1943.

### Supplies.

Supplies of materials and spare parts have been increasingly difficult to obtain. It has so far, however, been possible to maintain all essential services in operation and the stock position is reasonably satisfactory. A great amount of additional work for the staff has been involved in procuring essential supplies and ensuring that the limited resources available are used to the best advantage.

### Post-war Projects.

A number of projects for the Post War development of the Port are under consideration, though this is still in the preliminary stages. Among them may be mentioned development of the East Wall area, with the possibility of inclusion of a new cattle market, reclamation on Merrion Strand and development of the South Side of the River East of the River Dodder; construction of new Ocean Wharf, additional Transit Shed and Warehouse accommodation; improved Graving Dock facilities and provision for direct delivery of goods to the Custom House Docks Warehouses ex ship.

These projects will involve the acquisition of additional plant. In addition, the construction of new bridges across the Liffey, already recommended by the Town Planning Committee, will have to be considered.

It would not be advisable to complete final designs for most of these projects at present, since there have been many new developments in port construction work abroad during the war, of which details are not at present obtainable, and the adoption of the most up-to-date methods is, of course, desirable to achieve maximum economy and efficiency, and to enable Dublin to maintain its position as a first-class Port.

### Warehouses.

During the year the accommodation and facilities available at the Board's Warehouses, Custom House Docks, continued to be in demand, and a wide range of commodities was handled. Despite great changes in the flow of traffic and in the nature of the service required, the result of the year's working has been satisfactory.

Difficulties in the operation of the Department's cartage service caused by the shortage of motor spirit were largely overcome by the fitting of gas producing units to certain of the lorries.

The Emergency Warehouses at Chapelizod were taken over in January, 1943, and were immediately put into use. The Bonded Tobacco Stores have proved suitable for storage and working, and have been fully availed of by manufacturers. The General Warehouses have also been filled to capacity and have enabled the Board to provide accommodation for goods which could not satisfactorily have been dealt with in the Custom House Docks.

Finally, I wish to place on record my appreciation of the loyal co-operation I have received from the Board's Salaried Staff and in particular the heads of Departments, who have always been courteous and helpful. My thanks to labour also who are having a difficult time, and I trust they will also try and understand our difficulties.

# *London's Stake in Overseas Trade*

## *Address by Sir Eric Macfadyen, a Director of Harrisons & Crosfield, Ltd.**

Sir Eric Macfadyen gave a survey of London, as the largest concentration of population the world has known, as a great sea-port serving the whole United Kingdom and as the chief centre of international commerce and finance. He showed, by a brief account of London's history, the steps by which it has risen to its present pre-eminence, and its constant reliance upon overseas commerce for its livelihood.

### London a Cosmopolitan Market.

With the Industrial Revolution, London came to conduct a cosmopolitan market for the exchange of the surpluses of the wide world. For centuries it has been the largest town of the time, and the development of its port facilities have kept pace with the growth of its population, so that our most ancient port remains one of the most modern. London handles 70 per cent. of the meat, two-thirds of the rubber, over nine-tenths of the tea, nearly half the sugar and over 40 per cent. of the wool that enters the United Kingdom. At the same time it is the greatest of all our manufacturing areas, producing flour, furniture, pianos, rubber goods, motors, paper, margarine, biscuits, sugar, chemicals, paints, varnishes, oils, matches, radio appliances, electrical fittings, and a host of minor articles. The first essential of all these trades is to have their raw materials brought to their doors cheaply and in abundance, and to be guaranteed every facility for the movement of their finished goods.

Apart from these domestic services, the functions that London has discharged in the past in relation to the economy of the world have transcended even its activities as a port, and have in fact been unique.

Trade between nations consists essentially of transactions between individuals, but there is this practical difference between internal and external trade, that labour, capital, transport, enterprise, money exchanges operate much less freely across national frontiers than within them. Our first reaction to the force of economy gravity is to raise what defences we may against its pressure. We decline to see that trade is by nature indivisible, and our economic welfare inseparable from that of all others. Accordingly, we strive to insulate our national economies, and convert trade into a weapon of offence. Nevertheless, the benefits of the distribution of Labour are so insistent that commerce tends more and more to override frontiers. Our generation has coincided with a time of reaction; the trend of expansion however is persistent and progressive. The advance will be resumed.

During the hundred years between the French and German wars trade approached more nearly to the ideal of being multilateral than ever before. Sir George Paish has estimated that while the cost of living was lower at the end of the period than at the beginning, the money value of our national income had increased sixfold; our export trade meantime expanded thirteen fold. By 1913 we owned half the world's shipping, and had invested £6,000 millions overseas, providing a substantial part of the capital for the construction of nearly every railway in the U.S.A., and virtually the whole of their cost in Canada, Australia, New Zealand, India and South America.

The City of London provided the well articulated and properly lubricated international money machine (without which multilateral trade could not have thriven) through the specialised services of London's merchant banks and acceptance houses. The "bill on London" was the world's currency resting on a foundation of universal confidence in the smooth working of the money markets and the exchanges. To contemplate the creaking and groaning apparatus that succeded this well balanced system, with its standstill agreements, blocked accounts, arbitary clearings, fictitious exchanges, its rough and ready governmental transactions motivated by political pressure in an atmosphere of menace and aggression is like plunging from daylight into the blackout.

### Importance of the Export Trade.

The City knew no distinctions of race or creed or colour. It required of Producer, or Shipper or Entrepreneur only one qualification—credit worthiness; and his enterprise would be fostered and his goods cared for. The credits established in the City as a result of these multifarious operations were taken out in the form of British Exports. Half a million people got their living in the city, in banks and finance houses and insurance offices, as producemen, dealers, brokers, agents, accountants, shippers, warehousemen, and as the trained and expert staffs of all their diverse operations. Between them they were the chief distributors of the world's wealth and the begetters of a large part of it. It was their business to ensure that whoever had merchantable goods to offer might find a market for them here. £400 millions of our purchases were paid for by the income from overseas investments, the net income of our mercantile marine, the commissions, insurances, banking charges and all the miscellaneous services I have been describing as constituting the unique function of the City. That was how the account used to be balanced. How will it be balanced in future? Full employment in industry after the war and a rising standard of living will call for an ever greater volume of physical imports than formerly. In the list of our exports we must be prepared to make significant changes as many countries have now learned to do for themselves what formerly we did for them. The task of industry will be, nevertheless, to increase the total value of our exports by at least a third, perhaps a half. In this, London will bear its share. It will be an effort of brain rather than brawn; in the efficiency of our equipment and organisation, in courage and mental alertness, we shall have to show the world a lead; for quality will have to be our watchword.

The profitable sources of income which we had in our shipping, banking, insurance and marketing services came our way as incidental to our predominance at sea, and our position as suppliers of risk bearing capital. The great rich uncle of the post-war world is going to be the U.S.A. Mr. Eric Johnston has told us that our friends over there have every disposition to undertake new business. The City will not be the world's only, perhaps not in the long run, its chief, banker, insurer and so on. The U.S.A. will end the war owning most of the world's tonnage of shipping. She may not have learned that a great export trade cannot be one way traffic; that commerce involves a buyer as well as a seller. But this is a dilemma she will resolve in the light of experience. History has ended American isolationism, economic as well as political. That will be for the world's good; it certainly has implications for us which we will have to face in a spirit of realism. Can we face them with well founded confidence? My view is that we do not need to quail before the challenge. There would indeed be ground for despair if the body of world trade were a fixed quantity, but from the nature of things it is not. In an expanding world economy, the value of our share of a greatly increased total trade can exceed, and largely, that of the higher percentage of a lesser total which we formally accounted for; and this applies to both goods and services.

Scope will have to be found for international authority on a scale previously unknown in peace time; we must see to it that this does not preclude full scope being found at the same time for individual initiative. On the national level, we must strip off, as soon as may be, the straight jacket which war has forced on our commercial system, and claim for enterprise, in all it shapes, the freedom without which expansion will surely be frustrated. Technologically, our industries are in good shape. Our commercial community, given a fair field and no favour, will tackle new opportunities with zest. The genius of our race is not dimmed. In a critical time we have shown the world and ourselves, what a virile people can accomplish when fired by a united purpose. Britain and the British Empire stand, not at the end, but at the beginning of an epoch.

*Report of an Address delivered at a meeting, on 24th November, 1943, at Grosvenor House, London.

# *The Development of the Chicago Type of Bascule Bridge for Harbour Waters*

## *Discussion on the Paper by Mr. Donald H. Becker, M.Am.Soc.C.E.**

**Mr. C. B. McCullough, M. Am. Soc. C. E.,** made the following observations:—The development of the "Chicago Type" bascule structure is an interesting and clear-cut illustration of the adaptation of design types to meet special or particular local conditions. Numerous advantages inhere in this type, principal among which may be mentioned:

(1) Exterior blocking of the channel is avoided during operation. This advantage over the swing bridge assumes considerable importance in localities where it is essential to maintain maximum docking facilities along the river close to the structure, especially in those relatively narrow waterways such as the Chicago River, where the movable span constitutes the greater part of the stream crossing.

(2) It is possible for river traffic to approach within a comparatively short distance of a bascule structure, whereas for swing spans, craft must stand off much farther on account of the difficulty in negotiating a split channel and swinging around the draw rest.

(3) A bascule may be raised slightly to permit the passage of small boats which fail to clear by only a small margin, whereas, in general, a swing span must be opened a full 90 degs. for each vessel regardless of its vertical clearance. Because of this fact, bascule spans may be operated with much less interference to vehicular traffic, particularly in those instances wherein a great portion of the river traffic is relatively low-masted.

(4) For the bascule it is not necessary, as in the case of the swing span, to construct a large pivot pier in the centre of the channel. In certain locations, such a pier structure operates to deflect shoreward currents, with consequent destructive erosion along adjacent banks.

(5) The bascule span, unlike the swing span, does not require the construction of a draw rest in the centre of the channel, which construction always operates as a serious obstruction to the channel and a menace to water-borne traffic.

(6) It is possible to construct wide roadway structures (such as are necessary for traffic conditions in cities the size of Chicago) without the necessity of blocking the channel. This condition does not always prevail in the case of swing spans, for the reason that there is a definite relationship between the width of the roadway and the minimum dimensions that may be adopted safely for the pivot. If the roadway width is increased beyond a certain limit, the pivot pier becomes of such dimension as to obstruct the channel seriously.

(7) The bascule type lends itself to widening with a minimum of inconvenience to traffic because of the possibility of building additional roadway lanes immediately adjacent and alongside the existing structure, whereas such procedure is impossible in the case of a swing span because of the necessity for the maintenance of swing clearance during construction.

(8) In the bascule structure (in certain types at least), the raised leaves may be made to constitute an effective traffic barrier. This is a tremendous advantage as compared to the swing span, particularly in the case of heavy, high-speed traffic arterials, whereon accident elimination and control pose serious and challenging problems.

(9) As compared with the swing span, in general, the bascule structure is safer from the standpoint of water-borne traffic in that it eliminates the possibility of collision with the open end of the span when it is swung.

Most of the foregoing advantages derive from a comparison of the bascule bridge with the ordinary swing span. However, some of them are also applicable when such type is compared with the vertical life. In addition, it appears possible in the case of the bascule, particularly the double-leaf design, to develop a greater degree of esthetic or architectural excellence than in the case of either the swing span or the vertical lift.

The foregoing items constitute the principal advantages inherent in the bascule type, some of which were mentioned by Mr. Becker.

The paper covers the origin and development of one specialized form of bascule, which has justly been dominating the "Chicago type." The historical development which he traces is most interesting. Of special interest to engineers is his mention of he internal rack (heading, "The Improvement Period") developed by Mr. von Babo; the utilization of transverse trunnion girders; the gradual development of concrete as a counterweight material, the utilization in one instance of an operating rack attached to the side, instead of in the plane, of the truss; the utilization of roller bearings in lieu of phosphor-bronze bushings; and the use, in one instance, of hydraulic motors.

The Chicago type represents a particular adaptation to meet the demands imposed by local conditions. The entire movable ensemble rotates about one single trunnion. In comparison with the multiple-trunnion types, this development presents the advantage of simplicity in construction and at the same time operates to reduce to a minimum the number of parts needing lubrication. As compared to the rolling lift type, the Chicago type concentrates the centre of gravity at one fixed point during all phases of the operation. This type also discloses certain esthetic advantages as compared to most of the other types in common use. As mentioned by Mr. Becker, it is possible through the utilization of an arched lower chord, a full deck structure, and an appropriate architectural treatment of the operators' houses to produce an ensemble much more pleasing than is generally possible in other types. Fig. 21 is a view of a structure in this category which spans the Siuslaw River on the Oregon Coast Highway. It is illustrative of the possibilities in double-leaf simple trunnion bascule design in combination with reinforced concrete approach construction. The flanking approach spans of this bridge are 154-ft. reinforced concrete bow string arches.

**Fig. 21. 150-ft. Electrically operated double-lear Bascule Span across Siuslaw River on Oregon Coast Highway.**

Another advantage inherent in the Chicago type is the facility with which the raised leaf, in single-deck structures, can be converted into a traffic barrier. Fig. 22 is a line drawing of the shoreward end of a Chicago type span showing the location of the trunnion in reference to the break in the roadway floor. With a fixed total angle of opening, the clearance *C* between the fully raised leaves and the fixed roadway deck may be varied simply by moving the roadway break fore and aft along the longitudinal axis of the deck; in other words, simply by varying the angle as indicated. In view of the difficulty in safeguarding the operation of modern high-speed highway traffic, a positive barrier of this kind presents an advantage that cannot be overestimated.

A most important feature in the design of bascule bridges is that of controlling the sequence of the various events that compose an operating cycle. In general, such a cycle comprises the following incidents, which should occur in the order given:

*Published in the issues of September, October and November, 1943.

## *Development of Chicago Type of Bascule Bridge for Harbour Waters—continued*

Opening Cycle

(1) Operation of warning lights, signs, or signals;
(2) Closing of remote roadway gates, if any;
(3) Closing of near roadway gates, traffic barriers, and the opening of derails, if any;
(4) Unlocking the leaves;
(5) Opening the span.

Closing Cycle

(1) Closing the span;
(2) Locking the leaves;
(3) Raising the traffic barriers, near gates, and closing the derails, if any;
(4) Raising the remote gates.

The warning signs or signals may consist of bells, sirens, or whistles for the purpose of an audible warning, and the use of lights and semaphores for visual warning. The bells or sirens may be operated simultaneously with the closing of the gates

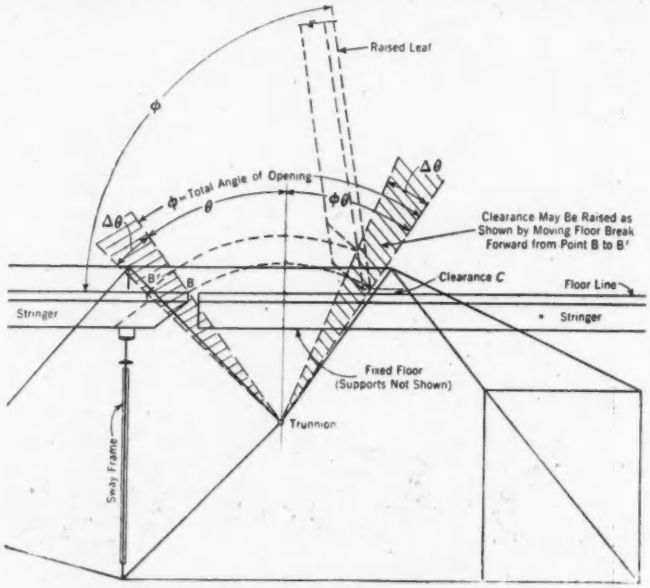


Fig. 22. Effect of varying opening in deck.

or they may cease before the gates are lowered. In general, a prolonged siren is objectionable in that it may drown out signals from river craft, for which reason it is generally the part of wisdom to terminate the siren signals before the roadway gates are lowered. However, this objection does not hold in the case of a traffic bell or gong, which may be kept ringing during the entire operation of the roadway gates. Lights or semaphore arms may be interlocked electrically with the roadway gates in such manner that the gates cannot be operated until such lights or semaphore arms are set to "danger." For example, an ordinary door-type switch may be cut into the gate circuit and installed on the semaphore arm in such manner that the roadway gate motor will remain dead or inoperative until the semaphore is set in its warning position, as indicated in Fig. 23. In a similar manner the traffic-light circuit may be interlocked to operate a relay which closes the gate circuit when, and only when, the light circuit is energized. It is also possible to arrange the circuits operating semaphore arms and traffic lights in such a way as to energize such circuits the instant the gate moves from its fully open position. Both of these arrangements and also a system of short-circuiting switches are indicated schematically in Fig. 23. In any interlocked operation of this kind, a short-circuiting arrangement is necessary; otherwise it is possible for electrical interlocking to interpose dangers as great as those which the ensemble is designed to avoid. The foregoing constitutes the essence of the first step in the electrical interlocking of operations.

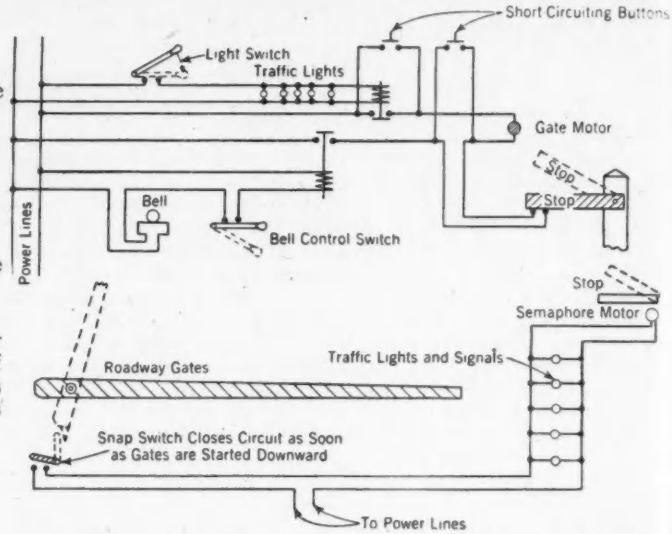


Fig. 23. Method of Interlocking Control of Gates and Warning Devices.

If, in addition to the roadway gates indicated in Fig. 23, the installation comprehends a second system of gates (near gates), traffic barriers or derails, the interlocking obviously should be extended so that it is impossible to close these devices unless and until the remote gates are closed.

It is obviously necessary to lock the leaves of a double-leaf bascule bridge together in order that the structure may transfer live-load shear. This locking is usually accomplished by a centre-locking arrangement, and, in addition, tail locks are sometimes used, as described by the author. Such devices are, in general, operated by means of a master switch or controller, and the wiring should be so arranged as to interlock with previous warning signals, gates, and barriers so that such locking devices cannot be released until all the signals, gates, barriers, etc., have been properly operated and set to warning. A schematic arrangement of this kind is indicated in Fig. 24.

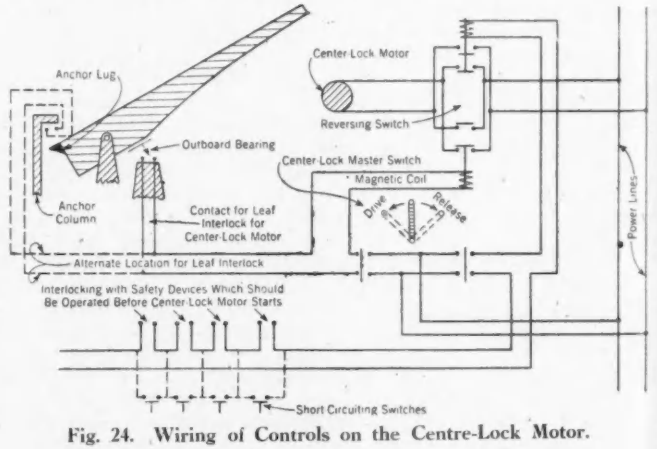


Fig. 24. Wiring of Controls on the Centre-Lock Motor.

In addition to the motors controlling the locking devices it is necessary, of course, to install motors for the purpose of operating the leaves. Such motors generally are controlled through a master switch. This switch should be wired through a contact on the centre lock which is closed only when the centre-lock pin is fully released, thus avoiding the possibility of damage by attempting negligently, to raise the leaves before they are unlocked. A schematic arrangement of this kind is indicated in Fig.25.

## *Development of Chicago Type of Bascule Bridge for Harbour Waters—continued*

In closing, the leaves of a bascule structure are generally lowered to a seat on an outboard or live-load shoe at the stream edge of the abutment and anchored at a rear bearing, as indicated in Fig. 24, to preclude the possibility of live load on the trunnion. At either of these points it is possible to install a device to complete an otherwise open circuit for the centre-lock or toil-lock motors in the " drive " direction, so that these devices will remain inoperative in that direction until the bridge

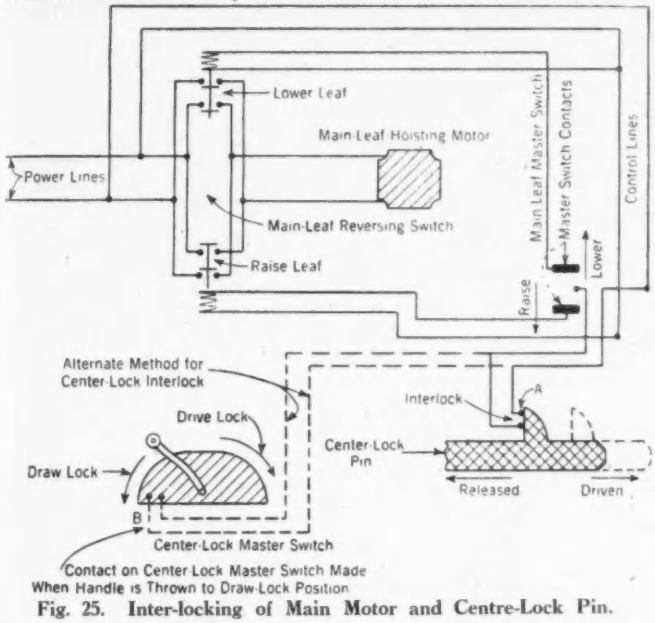


**Fig. 25. Inter-locking of Main Motor and Centre-Lock Pin.**

leaves are down, fully seated and correctly alined. If this interlock is not provided, the centre or tail locks can be driven while the bridge is in the open position. Although this in itself is not particularly objectionable (since the main motor circuit is wired so as to be inoperative except for these devices fully open or drawn) there is some danger of jamming the centre or tail-locking devices by attempting to drive them when the leaves are not fully seated and exactly alined, except in those cases where the locks are designed so as to draw the leaves together during he last part of their movement. When the wiring is such as to permit the operation of the centre-locking pins with the leaves partly open, it appears that provision should be made for making the roadway gates, traffic barriers, etc., inoperative when the leaves are raised, since otherwise such gates or barriers could be raised with the leaves partly or fully open. On the other hand, if the gate and barrier circuits are led through a pair of contacts, one on the centre pin and the other on its mating seat, then it is obvious that the leaves must be seated and the locking pins fully driven before the structure can be cleared for roadway traffic.

Fig. 26 is a schematic diagram showing interlocking contacts at the centre lock for the barrier and gate motor circuits. If the two contacts are at A and B, it is apparent that the gate or barrier circuit can be energized whenever the pin is driven forward, regardless of the position of the leaves, in which case additional interlocking should probably be provided on either the live-load shoes or the anchor columns. On the other hand, if the contacts are located at A and C, no additional interlock appears necessary.

If the gate or barrier circuits are interlocked with the leaves but not with the tail or centre lock, it is possible negligently to permit traffic over an unlocked span, thus inducing live-load stresses not contemplated in the original design.

In general, the sequence of all the remaining operations should be controlled by arranging each circuit so that it remains open until all of those operations, which normally should precede it, have been completed.

For low-power circuits, such as those for operating gates, signals, etc., the control switches may be cut directly into the line. For the main (high-power) operating circuits, however, magnetic contractors should be employed.

As an example of the dangers inherent in incorrect interlocking arangements, assume that contact A in Fig. 25 were placed on the centre-lock master switch instead of on the pin itself. In such a case, if the roadway gates or barriers were open, the circuit to the centre-lock motor would be open and the handle on the centre-lock master switch could be thrown to the draw-lock position with the pin still closed. Such an arrangement removes the safeguard of interlocking on the main hoisting motor circuit, thus making it possible for negligent operation to cause serious damage.

The foregoing are a few typical instances of electrical interlocking on bascule bridges. With the tremendous development in traffic densities and traffic speeds, the provision of adequate safeguards in this category becomes increasingly important. Each installation obviously presents its own interlocking problems. Sight distances, traffic speeds, traffic densities, etc., all operate to modify the arrangement of details. In a report covering this phase of bascule bridge design made by the writer in 1931,* the following general features of electrical interlocking were listed as necessary:

" (1) Each control circuit should be so wired that the prior operation must be actually and completely performed before it becomes operative.

" (2) Interlocking contacts must be positive in action and so located as to minimize the danger of short-circuiting or deterioration from moisture, ice, or mechanical injury.

" (3) Contacts should preferably be made by a spring or snap device rather than by a sliding motion in order to avoid sparking and injury to contact points or tips, although a certain amount of wiping motion may be advantageous in tending to keep the contacts clean and bright.

" (4) Make-and-break contacts for interlocking should not be placed directly in a heavily loaded power line but rather on an auxiliary or control circuit wired to operate a magnetic contactor cut into the main power line.

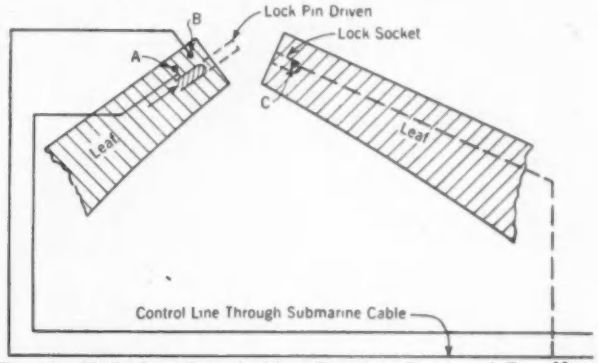


**Fig. 26. Methods of Inter-locking Circuit to Barrier of Gate Motors.**

" (5) Cross interlocking of operations should be provided wherever there is a danger due to the possibility of a failure of one phase of operation.

" (6) Short-circuiting buttons or switches should be provided to permit operation in the event of a failure of any portion of the interlocking mechanism.

" (7) In general, the entire interlocking arrangement should be as simple as possible, compact, sturdy, protected to the maximum possible extent, and so designed as

*" Electrical Equipment on Movable Bridges," by C. B. McCullough, A. L. Gemeny and W. R. Wickerham, " Technical Bulletin No. 265," U.S.D.R., Washington, 1931, p. 38.

## *Development of Chicago Type of Bascule Bridge for Harbour Waters—continued*

to eliminate as far as possible every conceivable traffic hazard and every contingency or event that might expose the structure to undue stress."

In addition to the necessity for interlocking as a method of securing the correct sequence of operations, it is obviously necessary to provide devices in the nature of limit switches for controlling or limiting the movement of the leaves. Thus the wiring diagram for an electrically operated bascule structure becomes quite complicated.

It was with considerable interest that the writer noted the mention of Mr. Pihlfeldt (see "Conclusion"), who for many years was engineer of bridges for the City of Chicago. It was Thomas Pihlfeldt who took the writer in his first inspection trip over the bascule bridges of Chicago nearly a quarter of a century ago and who first impressed upon him the necessity for the bridge engineer becoming fully conversant with the principles underlying electrical operation and control.

In closing, the writer wishes again to emphasize the importance of Mr. Becker's paper and its value to engineers engaged in this line of specialized endeavour. The writer has taken the liberty of adding these few pages in regard to electrical control and interlocking for the reason that this phase was not covered by Mr. Becker and for the further reason that credit for many of these features belongs to the Chicago group, to Mr. Pihfeldt, to Hugh E. Young, M. Am. Soc. C. E., engineer of bridge design, and to others in the city bridge engineering force. Never has a group of engineers more successfully pioneered the development of a bridge type especially adapted to local needs. In the perspective of more than forty years, the wisdom of the early type selections stands out unchallenged.

## *Review*

**The Shunter's Manual** by Edward S. Hadley. pp. 48. Price, 3s. 1944. Published by the Author at 42, Milton Road, Hanwell, London, W.7.

We are glad to welcome this handy little manual. Despite the more frequent and common association of shunting with main and branch line railway operation, no one with any knowledge of dock working can fail to be aware of the great importance of skilful and systematic shunting in connection with the work at port exchange sidings and the service of wagons at the quayside for the purpose of receiving or delivering goods at the ship's rail. Much time and labour can be saved by the judicious and efficient handling of wagons to and from the quays, where there are numerous opportunities for delay through marshalling trucks in the wrong sequence.

Although we have had frequent opportunities of witnessing wagon manoeuvring to suit the requirements of cranes and ships' holds, we cannot claim any actual experience in solving the problems confronting the shunter, but a perusal of Mr. Hadley's booklet shows unmistakeably how the exercise of care and forethought on the part of the shunter can save valuable time and expedite the loading and unloading of ships. The booklet is eminently practical and gives numerous diagrammatic illustrations of the order in which wagons can, and should be, arranged for diverse loads and under various conditions, so as to minimise displacement and avoid the excessive use of engine power, thereby effecting considerable economy in the consumption of locomotive coal.

The book is divided into ten chapters, the first of which surveys the general principles of the subject, enunciating the axiom that "the less a shunter uses his head, the more he has to use his heels." The other chapters deal in detail with specific cases under various conditions, while the last provides some exercises for reflection and study. Altogether, it is a commendable publication.

## *Quayside Pilferage*

### *Chairman of Liverpool Steamship Owners' Association on a "Continuing Menace"*

At the Annual Meeting of the Liverpool Steam Ship Owners' Association, held in Liverpool on March 21st, the retiring Chairman, Mr. J. W. Booth, in moving the adoption of the annual report, made the following observations on the pilferage evil at ports.

He said: "In the report we have referred briefly to the continuing menace of pilferage in the docks. To the Association and to the lines individually the struggle to reduce this evil is at times heartbreaking. The causes are clear, most of the methods of the thieves are known, and the treatment necessary to reduce the complaint to less scandalous proportions is obvious to those who have studied the problem as seriously as we have done.

"Owing to the shortages of supplies and rationing, temptation is great. Because of black-out restrictions and the results of enemy action, opportunity is far greater than in peace-time. In addition to this there has been a tremendous turnover in manpower, which has quite possibly permitted an influx of undesirable characters to the docks.

**Government Inaction.**

"The obvious remedy is to reduce the opportunities for pilferage and large-scale thieving and increase the punishment of those who are apprehended and found guilty. What can be done by the lines and stevedoring companies to reduce opportunity is being done, but in the main the remedy here, as with the severity of punishment, is in the hands of the Government. Perhaps the official view is that moral standards do deteriorate in wartime and, therefore, the present level of losses is inevitable. Be that as it may, our representations that more drastic action should be taken have met with no favourable response. Though thefts from the docks constitute an offence no less serious than looting, particularly when parcels for our prisoners of war, or provisions from lifeboats, or supplies for the armed forces abroad are taken, in law this is not looting, so the penalties remain ridiculously light.

"Possibly the losses are not sufficiently injurious to the war effort to justify an increase in the police forces assigned to the detection of dock thieves, but a concerted drive against these people by the police actually available can have good effect, as has been seen recently in Birkenhead.

"Docks have no monopoly of thieves and the chairmen of the four great railways have each referred to their losses at their annual meetings. To deal with the black market racket really heavy penalties were authorised and inflicted, with the result that this scandal has been got, and kept, under control. Surely it is common sense that punishments comparable to those meted out to black market racketeers would be equally effective in stamping out these abuses on the docks and railways. No satisfactory explanation for the continued inaction of the Government has been forthcoming to the Association."

**Blyth Harbour Commissioners.**

Mr. A. S. Witherington, a member of the firm of Messrs. Witherington and Everett, Shipowners, has been elected Chairman for the ensuing year of the Blyth Harbour Commission in succession to Colonel N. I. Wright, who has held the post for the past three years and Mr. R. Lishman has been elected vice-chairman.

Commenting on the annual report and accounts of the Blyth Harbour Commission for the past year, Mr. A. S. Witherington, said that trade continued to suffer because of war-time restrictions and, accordingly, the port revenues had declined while, at the same time through rising costs of labour and material, expenditure had substantially increased. The accounts for 1943 revealed a working deficit and the Commissioners are investigaing the possibilities of obtaining additional sources of revenue.